



**LATE-TERM NEST INCUBATION AND HATCHLING RELEASE
OF NORTHEASTERN GULF SEA TURTLE NESTS IN RESPONSE TO
APRIL 2010 *DEEPWATER HORIZON* OIL SPILL**

REVISED FINAL REPORT

May 12, 2011

Submitted to
Sandy MacPherson
National Sea Turtle Coordinator
U.S. Fish and Wildlife Service
Jacksonville, FL

Prepared by:
Jane A. Provancha and Paula Mukherjee

Innovative Health Applications, LLC
Medical Environmental Support Contract
Environmental Services Branch
Mail Stop: IHA-005
OHF, Rm 1104
Kennedy Space Center, FL 32815

DISCLAIMER

This report discusses the results of the sea turtle nest translocation effort under the *Sea Turtle Late-Term Nest Collection and Hatchling Release Protocols for the Florida Panhandle and Alabama in Response to the Deepwater Horizon (MC-252) Incident* plan. This plan is not part of the ongoing *Deepwater Horizon* Natural Resource Damage Assessment. It does not, and is not intended to, reach any decisions or determinations about natural resource damages arising as a result of the oil spill and response to the oil spill.

INTRODUCTION

On 20 April 2010, the largest marine oil spill in U.S. history occurred about 50 miles southeast of the Mississippi River delta in the Gulf of Mexico. It was caused by an explosion on the Deepwater Horizon offshore oil platform (28.74°N, 88.39°W) at the Macondo well (Mississippi Canyon 252). Eleven platform workers were killed and the Deepwater Horizon ultimately sank in about 5,000 feet (1,500 m) of water on 22 April. The explosion, fire, and subsequent sinking of the platform caused discharges of crude oil and other substances from the rig and from the wellhead on the seabed into the Gulf of Mexico (referred to as the “Deepwater Horizon Oil Spill”). Attempts to shut down the flow of oil failed when a safety device could not be activated. The oil posed risks to wildlife, including all life stages of sea turtles. After a series of failed efforts to plug the leak, on 15 July, the well was capped, stopping the flow of oil into the Gulf of Mexico for the first time in 86 days.

The following report describes our specific support in the translocation of sea turtle nests located within a zone threatened by the *Deepwater Horizon* Oil Spill. This effort was carried out under the Unified Command’s approved plan titled *Sea Turtle Late-Term Nest Collection and Hatchling Release Protocols for the Florida Panhandle and Alabama in Response to the Deepwater Horizon (MC-252) Incident*. Hatchlings from these nests emerge and move to the coastal and pelagic waters beginning in late June through October. The risks to hatchlings in late June and July 2010 were evaluated and determined to be extremely high as their migratory journey would take them through the oil laden surface waters. Not until the middle of August, approximately 1 month after the well was capped, was it determined that risks to hatchlings emerging from beaches and entering the waters off the Alabama and northwest Florida coasts were diminished enough to be lower than the risks involved with translocating nests during late incubation to the east coast of Florida.

In early June 2010, the U.S. Fish and Wildlife Service (USFWS), NOAA’s National Marine Fisheries Service (NOAA-Fisheries), and Florida Fish and Wildlife Conservation Commission (FWC) determined that conditions in the northeastern Gulf of Mexico were deteriorating beyond acceptable risk with respect to emergent hatchlings as a result of the *Deepwater Horizon* explosion and oil spill. The USFWS and FWC were facing the impending emergence of approximately 50,000 sea turtle hatchlings from these beaches. If left *in situ* and allowed to emerge from their nests and enter Gulf waters, these hatchlings were highly likely to encounter oil while swimming at sea within the first few weeks of their ocean phase. Sea turtle experts within USFWS, NOAA-Fisheries, and FWC had been discussing various alternatives with a variety of sea turtle scientists and, in June, requested Innovative Health Applications (IHA) to consider providing support for a plan for late-term nest translocation and subsequent release of hatchlings to Atlantic waters where: the oil threat was very low, secure facility options existed, and experienced permitted sea turtle biologists were available to help. The decision was made to

collect and transport eggs during late incubation when transport of the incubating eggs was less likely to result in the loss of viable embryos and the middle third of incubation when sex determination occurs was already completed.

On 25 June, the USFWS Southeast Region's Assistant Regional Director for Ecological Services issued the official memorandum of the Emergency Section 7 Consultation to implement sea turtle late-term nest translocation and hatchling releases for the Florida Panhandle and Alabama coasts (Appendix A). In mid-June, it was determined that the translocation effort was to be in place prior to 26 June, when the first Gulf late-term sea turtle nest was required to be excavated for delivery to the Atlantic for final incubation and release.

IHA agreed to provide and operate a secure Florida Atlantic coast incubation facility for the late-term sea turtle nests. IHA was responsible for maintaining all nests for the short remainder of their incubation period following their transport to the Atlantic Coast site at Kennedy Space Center (KSC). IHA was additionally responsible for releasing hatchlings on Atlantic Coast beaches following their emergence from their nests. Sandy MacPherson, the U.S. Fish and Wildlife Service's National Sea Turtle Coordinator based in Jacksonville, Florida, was the Service's oversight officer with back-up assistance from Ann Marie Lauritsen of the USFWS in St. Petersburg, Florida. Jane Provancha (Environmental Services Branch, IHA) provided oversight and responsibility for the incubation facility and release operations from IHA (Medical and Environmental Services Contract, MESC) at KSC, Brevard County, Florida.

IHA expedited the commission of a support facility, assisted with the coordination of nest translocations to the facility, procured and organized incidental items, established a database, participated in technical coordination, and mobilized staff for the effort. IHA evaluated facility options at Merritt Island National Wildlife Refuge (MINWR), Canaveral National Seashore (CNS), Cape Canaveral Air Force Station (CCAFS), and KSC. A structure on KSC was chosen and IHA received full coordination and approvals from NASA to provide support to this effort under its "Work for Others" Contract option within the Medical and Environmental Services Contract on 21 June. While evaluation and mobilization efforts began in mid-June, the planned period of performance and demobilization was 25 June 2010 – 31 December 2010.

Additionally, coordination to gain permission for the following activities was required: amendment of Federal and State sea turtle permits; approval by NASA-Institutional Animal Care and Use Committee; and investigative and coordination access to various beach sites intended for the release of hatchlings. Initial coordination for hatchling release sites was with CNS, MINWR (NASA-KSC property), CCAFS, and Archie Carr National Wildlife Refuge. Figure 1 shows the relative vicinity of the Gulf nests and hatchlings at risk and the incubation facility on the Florida Atlantic coast at KSC.

Figure 1. Vicinity map of the incubation facility at KSC as indicated by a red star and the Gulf area where nest translocations occurred, indicated by red brackets.



METHODS

The KSC facility chosen to incubate the late term sea turtle nests was a concrete block office and warehouse building (J6-2377) with an aluminum roof. It was located on the east side of Kennedy Parkway just north of the Vehicle Assembly Building and south of the Saturn Visitor Center. In spite of the fact that the building was relatively old and had poor insulation, it was capable of withstanding inclement weather and protecting nests from predators. The interior had a standard climate-control system and was properly ventilated. The incubation facility's interior temperature was set between 26.6-32.0°C. Two central cooling/heating thermostat units were checked and recorded daily for ambient temperature within the facility where nests were staged. Unit 1 was located near the east entrance while Unit 2 was located on the north central wall of the main room. Additionally, an independent mobile digital sensor (HOBO) measured and recorded the facility temperature and humidity every 15 minutes. In addition to the AC control

system, portable floor fans were distributed to increase ventilation and cooling as needed. An AC unit was occasionally used in a separate room that provided space for office activities and post nest incubation inventories.

Prior to and during the translocation period, the facility was visited at least once daily to record ambient temperature, as well as check on nest status and facility security. Plastic, wood, and metal folding tables were used as platforms for the nests (see Appendix A for a diagram of the KSC incubation facility). This arrangement elevated the nests to the same level off the ground, and made for easy access for the monitoring staff. The lower legs of the nest tables were coated with Vaseline to prevent invasion by crawling insects (i.e., ants). The building was a locked and limited access facility with signage. It was also equipped by the NASA Public Affairs Office with 24-hour video tracking for time-lapse documentation.

A team was organized and trained to care for the translocated nests. USFWS, NOAA-Fisheries, IHA, and FedEx coordinated a weekly schedule of dates and times for arrivals, and arranged restricted access to KSC for FedEx's transport vehicle. Once in place, FedEx's web based tracking service (www.euroscanweb2.com) provided efficient coordination of nest arrivals as well as access to vehicle temperature data during transit.

Designated and permitted IHA and NASA staff (FWC Marine Turtle Permit # MTP-10-114, see Appendix A) were mobilized for each delivery of translocated nests. The staff carefully unloaded the foam nest boxes, gently turning and moving forward, so as to ensure minimal disruption in development of late-term embryos. Of particular concern was any sudden movement or tilting that could damage the connection between eggshell and embryo.

Nest boxes were moved from truck pallets to assigned nest tables in the incubation facility. Nests generally arrived with four to five layers of eggs in each box, and typically had one inch of sand covering the top layer of eggs. Unoiled sand from the beach of origin accompanied the delivery of respective nests. Upon arrival, nests were covered with an additional 2-3 inches of native beach sand and their foam box lids were replaced with perforated, clear acrylic grates. The use of the acrylic lids ensured hatchlings would not escape upon emergence.

Each nest arrived with a "Master Nest Identification Number" and an accompanying data form, provided by USFWS and the nest excavators. Upon arrival at the incubation facility, the KSC Inventory sheet was used to record each nest's "Master Nest Identification Number," excavator egg count, species, nest deposition date, time and date of arrival at the KSC incubation facility, and comments or unique observations. Temperatures were recorded for nests equipped with thermistors.

Upon placement in the incubation facility, all nests were monitored each morning for general signs of impending emergences and surface moisture levels. Temperatures of nests equipped with thermistors were recorded. Emerged hatchlings were observed for hydration and spritzed with de-ionized water if needed. Nest boxes with emerged hatchlings were covered with thin black cloth fabric to ensure a near-dark environment and reduce light-induced stimulation of hatchlings to conserve hatchling energy prior to release.

Only designated, permitted individuals were allowed to receive and release hatchlings during this response effort. The original release plan was to disseminate hatchlings to numerous beaches between the northern end of the Canaveral National Seashore, near New Smyrna Beach, to as far south as the Sebastian Inlet area on the Archie Carr National Wildlife Refuge. However, the majority of releases occurred at the release sites closest to the incubation facility at the southern end of the Canaveral National Seashore, Kennedy Space Center, and Cape Canaveral Air Force Station. This minimized the expenditure of energy by hatchlings during transport and before release. Each specific beach access point was chosen based on a variety of factors to support successful release, such as the smallest artificial light exposure, local operations, the anticipated number of hatchlings to be released, and weather conditions.

Each night all nest boxes in the incubation facility were examined using red LED lights. Fully emerged hatchlings that appeared vigorous were collected and counted. Handlers collected only those having transverse plastral folds fully closed and absent of signs of exposed yolk sac. If a hatchling was found in full frenzy with small bits of yolk sac still attached, it was released that evening assuming a short crawl down the beach would assist in abrading the remnants. In other cases, if larger bits of yolk sac were evident and the animal was less “energetic,” it was kept in the covered nest box for an additional 24 hours prior to release. The number of hatchlings collected for release from each nest was recorded. The hatchlings were carefully transferred to unused nest boxes lined with a layer of sand. These boxes were kept in the dark and covered with the black cloth for transport.

Red LED lights were also used to access release sites and temporarily allow visibility to begin the hatchling release on the beach. This use was kept to a minimum to reduce: 1) disorientation of hatchlings, 2) disturbance to any nearby nesting females or *in situ* emergent hatchlings, and 3) disturbance to other wildlife. Releases were executed just landward of the surf zone such that hatchlings would crawl the short distance to the water on their own. A final visual check of the release area and surf zone was performed for 10-15 minutes after each release to check for any remaining hatchlings that had not entered the surf. In the rare event that hatchlings were unable to make their way off the beach, they were returned to the incubation facility for release the following night. The locations and observations of releases were noted on IHA release data forms.

Nests were inventoried in accordance with the general guidance of the FWC once hatchlings emerged and were released. In cases where a nest had no emergence or release activity, inventories were done 70 days after the nest deposition date.

Under our artificial incubation conditions, the standard categories for sea turtle nest success reporting (standard FWC success reporting form) did not fully apply. While *in situ* inventories are a static evaluation of the total number of hatched and unhatched eggs, ours were iterative evaluations, tracking findings in incubation until certain release or death. Table 1 provides clarification of our categorizations. If hatchlings were released, they were counted as “released”. Those having the potential for release (“live in nest” and “live pipped”) were followed until they were released or died. For our purposes, the count of “released” represents the number of all hatchlings that survived and were released.

Table 1. Clarification of our success reporting as related to the standard FWC inventory.

Hatched or Unhatched	Category	Definition	Includes
Hatched	Hatchlings Released	All live hatchlings eventually released	1) Hatched 2) Live in Nest which was eventually released 3) Live Pipped which eventually hatched
Hatched	Live in Nest	Live in Nest on day of evaluation	Live in Nest
Hatched	Live Pipped	Live Pipped on day of evaluation	Live Pipped
Hatched	Dead in Nest	Dead in Nest on day of evaluation	1) Dead in Nest 2) Live in Nest which eventually died 3) Live Pipped which eventually died
Hatched	Dead Pipped	Dead Pipped on day of evaluation	Dead Pipped
Unhatched	No Embryo	No Embryo on day of evaluation	No Embryo
Unhatched	Partial Embryo	Partial Embryo on day of evaluation	Partial Embryo
Unhatched	Fully Developed	Fully Developed Embryo on day of evaluation	Fully Developed

Per the FWC nest inventory guidelines, the following data were collected: status of hatched eggs (live in nest, dead in nest) and unhatched eggs (live pipped, dead pipped, no embryo, partial embryo, fully developed embryo). Our process tracked the following activities: 1) nest arrivals, 2) daily nest checks, 3) daily facility temperature checks, 4) nightly releases, and 5) iterative nest inventory reporting. Activities were recorded on customized forms and entered into an Excel spreadsheet. Nightly release statistics were reported the following day for the Unified Area Command daily Consolidated Fish and Wildlife Report. Daily input was submitted to the Sea Turtle Unit lead (Barbara Schroeder, NOAA-Fisheries) or her designee (Sandy MacPherson, USFWS). The daily submission included the number of new nests received, species, the state origin, and the number of hatchlings (by species) released the night before. Full nest assessments conducted from 12 August 2010 forward were made available to the *Deepwater Horizon* National Resource Damage Assessment (NRDA) team for sampling.

RESULTS AND DISCUSSION

A total of 274 nests representing three species were delivered to KSC between 26 June and 19 August 2010. In addition, a single hatchling was shipped from nest FL68; this “nest” is not included in any statistical summaries. The majority of nests (96.7%) were *Caretta caretta* (loggerhead) with the remainder being *Lepidochelys kempii* (Kemp’s ridley, 1.8%) and *Chelonia mydas* (green, 1.5%). Table 2 displays the total number of nests and eggs that arrived at the incubation facility by species, and Table 3 displays the arrival schedule for nests by species and state of origin. The majority of nests (258) came from Florida and 16 nests came from Alabama.

Based on discussions with excavators, several nests were very small or “partial nests” due to problems on the beaches, or nests that partially hatched prior to excavation. Impacts preceding excavation included events such as coyote predation, vegetative invasion, and inundation by high tides. These impacts were generally documented by the Gulf nesting beach teams on forms that accompanied each nest. With these caveats, the overall range for nest size delivered to KSC was 2 to 209 eggs (nests FL45 and FL69, respectively). Discussions with excavation managers indicated their suspicion that FL69 was likely a combination of two nests deposited in the same location. Over 70% of the loggerhead nests had greater than 90 eggs.

Table 2. Number of nests, number of eggs, and mean egg count per nest for all nests translocated to the KSC late-term incubation facility.

Species	Total Number of Nests	Total Number of Eggs	Mean Number of Eggs per Nest
<i>Caretta caretta</i>	265*	27,618	104
<i>Lepidochelys kempii</i>	5	483	97
<i>Chelonia mydas</i>	4	580	145
TOTAL	274	28,681	N/A

* Does not include nest FL68, which only included a single hatchling and no eggs.

Table 3. Daily and aggregated nest arrivals by date, species and state of origin.

Date	Loggerhead		Kemp's Ridley		Green		TOTAL # OF NEST IDS
	Alabama	Florida	Alabama	Florida	Alabama	Florida	
26-Jun				1			1
9-Jul		2					2
13-Jul	1	5					6
15-Jul		2					2
17-Jul	1	8					9
20-Jul	1	12					13
22-Jul	1	5	1				7
24-Jul	1	15		1			17
27-Jul		15					15
29-Jul		29		1			30
31-Jul	1	29				1	31
3-Aug	1	29					30
4-Aug		3					3
5-Aug	2	15					17
7-Aug		20				1	21
10-Aug	1	21		1		1	24
11-Aug		3					3
12-Aug	2	14				1	17
14-Aug	3	9					12
17-Aug		10					10
19-Aug		4					4
TOTAL	15	250*	1	4	0	4	274

* Does not include nest FL68, which only included a single hatchling and no eggs.

Facility Temperatures

Nest incubation facility temperatures fluctuated diurnally depending on outside ambient temperatures. Temperatures inside the facility typically dropped naturally overnight. The AC temperature units did not require any lower threshold settings, but upper temperature settings were not allowed to exceed 33°C. Facility temperatures were manually recorded from 6/29/10 to 9/10/10, typically between 6:00am EST and 9:00am EST. As seen in Figure 2, facility temperatures measured this way ranged from 26 to 31.5°C. Manual collections did not occur on 7/25, 8/11, 8/13, 8/31, 9/1, 9/2 and 9/8. The temperature logger (HOBO) provided a more robust set of data through continuous temperature and humidity readings every 15 minutes. These data were collected from 7/14/10 to 9/21/10, and temperatures ranged from 26.7 to 30°C. The data are displayed in Figure 3 as 24-hour averages and 95% confidence intervals. These temperatures were within acceptable ranges for late stage nest incubation.

Figure 2. Daily manual recordings of the incubation facility's temperature and humidity. Blue bars depict Unit 1 thermostat, red bars depict Unit 2 thermostat, and relative humidity is depicted by the green line.

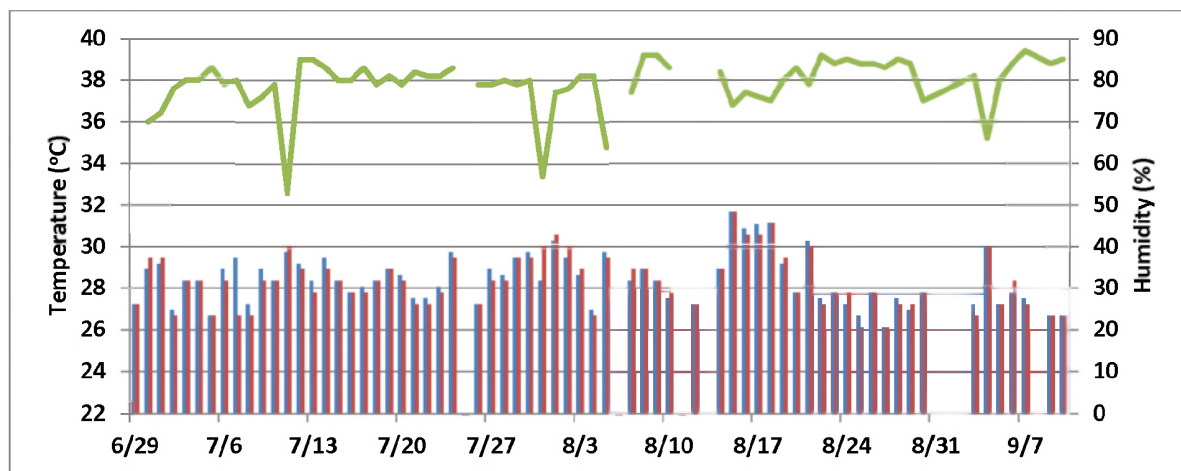
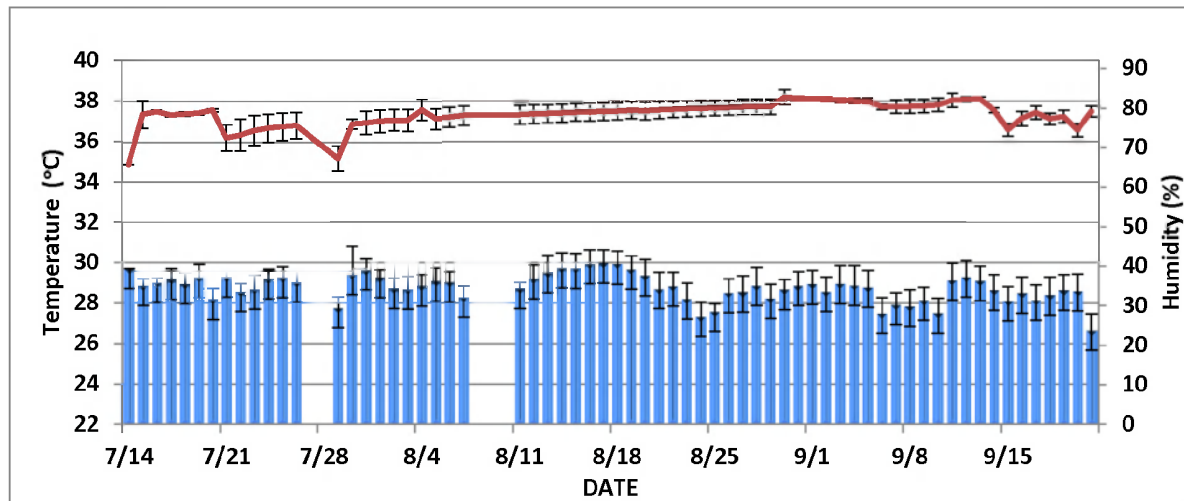


Figure 3. Automated recordings of temperature and humidity displayed as 24-hour averages and 95% confidence intervals. Blue bars depict the temperature recordings and the red line depicts relative humidity. The HOBO reader needed to be removed from the incubation facility occasionally to download data and with no replacement, data gaps occurred as shown by breaks in the data.



Nest Temperatures

Eighty nests (29% of nests received at the KSC facility) had been fitted with temperature sensors during egg collection by the Gulf nesting beach team. The once per day temperatures of these nests are found in an electronic database accompanying this report and are summarized in Table 4. All temperatures were within the normal ranges reported in the literature as appropriate for incubating nests. Note that sex of the hatchlings is determined in the middle period of incubation, which occurred on the natal beaches prior to nest excavation.

Table 4. The summary for temperature and date ranges for sensor equipped nests for each species. The single green turtle nest is FL235 and the two Kemp's ridley nests are FL1 and FL254.

Species	Nests With Temperature Monitors	Temperature Range (°C)	Date Range
<i>Caretta caretta</i>	77	25.0-34.4	27-Jun to 10-Sept
<i>Lepidochelys kempi</i>	2	26.0-29.8	26-Jun to 15-July
<i>Chelonia mydas</i>	1	26.0-32.7	12-Aug to 23-Aug
TOTAL	80	25.0-34.4	27-Jun to 10-Sept

Temperature data from 61 of the 80 nests with sensors that produced hatchlings are given in Table 5. Table 6 presents temperature data from the remaining 19 sensor-equipped nests that did not produce hatchlings. These nests had slightly lower average temperatures than sensor equipped nests that produced hatchlings; 28.3°C versus 29.0°C, respectively.

Table 5. For each individual nest that had some hatching success, temperature ranges and means during incubation are listed. All nests are loggerheads with the exception of one green (FL235) and one Kemp's ridley (FL1).

Nest IDs	Deposition Date	Final Release Date	Incubation Span (days)	Temp Range (°C)	Mean Temp (°C)
AL1	22-May	21-Jul	60	26.2-32.4	29.7
AL2	28-May	24-Jul	57	27.4-31.2	29.3
AL3	30-May	4-Aug	66	28.2-30.5	29.5
FL1	8-May	12-Jul	65	26.0-29.8	28.1
FL6	24-May	22-Jul	59	27.7-30.0	28.8
FL9	26-May	2-Aug	68	30.0-32.4	31.4
FL12	27-May	26-Jul	60	27.6-31.3	29.2
FL15	28-May	29-Jul	62	28.1-31.5	29.2
FL19	25-May	31-Jul	67	28.4-31.2	29.8
FL22	31-May	30-Jul	60	28.3-32.1	29.8
FL24	1-Jun	4-Aug	64	27.6-30.6	28.9
FL25	1-Jun	26-Jul	55	27.9-32.9	30.0
FL33	29-May	24-Jul	56	27.2-31.4	28.6
FL34	29-May	26-Jul	58	28.0-32.7	29.9
FL38	4-Jun	27-Jul	53	27.6-32.6	29.2
FL40	4-Jun	3-Aug	60	29.3-34.4	32.1
FL41	4-Jun	1-Aug	58	27.6-32.6	29.7
FL43	30-May	3-Aug	65	28.3-30.4	29.2
FL47	5-Jun	28-Jul	53	28.1-31.5	29.2
FL49	6-Jun	30-Jul	54	28.8-31.4	29.6
FL51	5-Jun	7-Aug	63	28.3-29.7	28.9
FL55	30-May	9-Aug	71	27.3-31.8	30.6
FL67	9-Jun	7-Aug	59	27.0-31.9	29.8
FL69	9-Jun	20-Aug	72	25.7-31.0	29.0
FL72	7-Jun	10-Aug	64	28.2-32.9	29.6
FL75	9-Jun	15-Aug	67	27.4-29.9	28.8
FL91	10-Jun	2-Aug	53	26.8-31.5	29.3
FL92	10-Jun	8-Aug	59	25.6-32.2	27.8
FL100	12-Jun	3-Aug	52	27.5-31.2	29.6
FL101	13-Jun	11-Aug	59	28.0-31.6	30.3
FL115	14-Jun	11-Aug	58	29.1-30.2	29.7
FL117	15-Jun	14-Aug	60	27.5-29.1	28.5

Nest IDs	Deposition Date	Final Release Date	Incubation Span (days)	Temp Range (°C)	Mean Temp (°C)
FL126	15-Jun	9-Aug	55	28.9-31.8	30.8
FL127	16-Jun	9-Aug	54	25.9-31.3	28.2
FL129	16-Jun	10-Aug	55	28.2-29.6	29.0
FL144	9-Jun	12-Aug	64	27.7-32.3	29.5
FL146	17-Jun	12-Aug	56	26.4-31.2	28.7
FL147	17-Jun	19-Aug	63	26.4-31.5	28.2
FL160	17-Jun	15-Aug	59	26.1-30.0	27.9
FL167	19-Jun	14-Aug	56	27.8-31.5	29.4
FL169	19-Jun	14-Aug	56	29.1-30.1	29.6
FL170	19-Jun	13-Aug	55	27.6-30.6	29.0
FL178	13-Jun	12-Aug	60	27.2-31.7	29.6
FL181	16-Jun	13-Aug	58	26.1-29.2	27.7
FL195	22-Jun	14-Aug	53	26.3-30.6	28.6
FL219	19-Jun	24-Aug	66	26.2-31.1	27.9
FL235	25-Jun	30-Aug	66	26.0-32.7	28.8
FL240	26-Jun	22-Aug	57	26.4-28.4	27.2
FL241	26-Jun	20-Aug	55	26.1-31.4	27.6
FL242	27-Jun	20-Aug	54	26.7-29.7	28.4
FL260	30-Jun	2-Sep	64	26.7-32.5	28.2
FL270	28-Jun	24-Aug	57	25.7-30.1	27.4
FL274	29-Jun	23-Aug	55	25.6-31.9	27.8
FL288	29-Jun	31-Aug	63	26.3-31.3	29.0
FL296	1-Jul	27-Aug	57	26.0-33.7	29.0
FL317	27-Jun	19-Aug	53	25.8-30.2	26.6
FL326	5-Jul	2-Sep	59	25.9-31.4	28.6
FL347	1-Jul	30-Aug	60	25.5-30.2	28.2
FL348	1-Jul	23-Aug	53	25.7-30.9	27.0
FL540	27-Jun	26-Aug	60	25.4-31.3	27.2
FL580	3-Jul	9-Sep	68	26.0-31.5	29.2
OVERALL				25.4-34.4	29.0

Table 6. Nest temperature ranges and averages for sensor equipped nests that had no hatching success. All were loggerheads with the exception of one Kemp's ridley (FL254). Some nests exceeded the targeted 70-day cutoff for initiating nest inventory to allow the NRDA team to collect samples.

Nest IDs	Deposition Date	Inventory Assess Date	Duration at Incubation Facility (Days)	Temp Range (°C)	Mean Temp (°C)
FL2	21-May	30-Jul	70	27.4-29.3	28.2
FL3	21-May	30-Jul	70	27.0-29.4	28.0
FL4	24-May	1-Aug	69	26.8-29.2	28.3
FL5	22-May	30-Jul	69	27.9-29.5	28.6
FL8	18-May	29-Jul	72	27.4-29.2	28.1
FL10	26-May	9-Aug	75	27.7-29.9	28.8
FL11	26-May	4-Aug	70	27.0-29.5	28.4
FL17	28-May	9-Aug	73	27.7-29.8	28.9
FL29	1-Jun	24-Aug	84	27.3-29.2	28.5
FL35	4-Jun	13-Aug	70	27.4-29.6	28.5
FL37	3-Jun	15-Aug	73	27.7-29.6	28.3
FL46	5-Jun	21-Aug	77	27.2-29.8	28.2
FL93	11-Jun	25-Aug	75	26.8-29.5	28.4
FL102	13-Jun	24-Aug	72	28.1-29.9	28.9
FL130	16-Jun	3-Sep	79	27.2-31.1	28.0
FL186	16-Jun	30-Aug	75	26.4-29.2	28.0
FL224	24-Jun	3-Sep	71	26.1-28.6	27.5
FL254	21-Jun	31-Aug	71	26.5-28.8	27.8
FL286	29-Jun	7-Sep	70	26.3-28.2	27.5
OVERALL				26.1-31.1	28.3

Nest Success

Pre-emergence signs and hatchling emergences generally progressed over many days for each nest. Typical signs that a nest was beginning to hatch were small depressions or star-shaped cracks at the sand surface. Figure 4 is a photograph of this emergence sign as seen in the incubation facility. In addition to seeing hatchlings at the surface, it was not uncommon to observe egg shells pushed to the surface (Figure 5). Sometimes hatchlings were only partially emerged, apparently resting with just their heads and sometimes front flippers exposed at the surface. A partially pipped egg would occasionally be pushed to the surface. These pipped eggs were sometimes reburied by us but they were always left to extricate themselves from the egg on their own.

Figure 4. Initiation of hatching resulted in depressions or cracks in the sand surface of nest.



Figure 5. Emerged hatchlings on the surface of the sand within a typical nest box with egg shells also pushed to the surface.



There were some typical hatchling anomalies observed, such as albino hatchlings and twins within eggs. These congenital anomalies are not uncommon and occurred before the nests were excavated for translocation.

Hatchling Release

The first hatchling release occurred on 10 July 2010 for nest FL1 (Kemp's ridley), which had an incubation period of 64 days. Three days passed from the first to the last release from this nest with a total of 57 hatchlings entering the ocean (86% success). Upon first emergence, these hatchlings seemed more lethargic than our previous experience with *in situ* loggerheads. We were assured (Dr. Donna Shaver, Padre Island National Seashore, personal communication, 2010) that this is normal and taking into account the earlier points made about the reduction in nest depth, this seemed to be acceptable. Once released on the beach, these hatchlings made their way to the water with normal sea turtle composure, still slower than the typical loggerhead.

This first release occurred on the isolated and dark Canaveral National Seashore beach as did over 95% of the remaining releases during this event. Subsequent nighttime releases occurred through 9 September. Hatchlings were released at various locations (see Figures 6 and 7 and Appendix B), but the majority of releases occurred within the southern Canaveral National Seashore at the southern-most parking lot on Playalinda beach referred to by us as "CNS P#1."

Appendix B contains the details of every release associated with each productive nest, including date, location, and number hatchlings.

Figure 6. Relative location of the sites used for the hatchling releases. All were within the KSC, Canaveral National Seashore, and the Cape Canaveral Air Force Station.

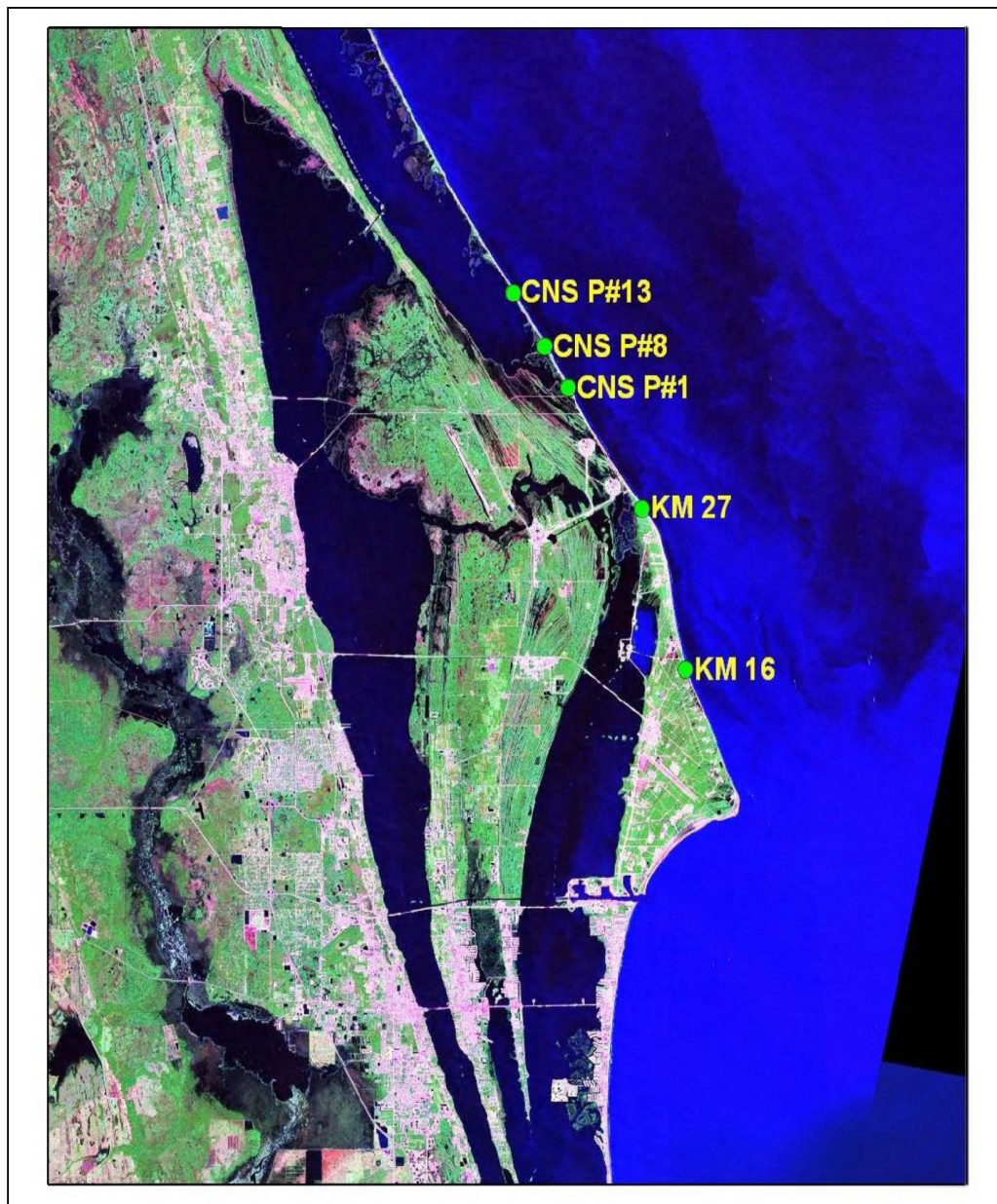
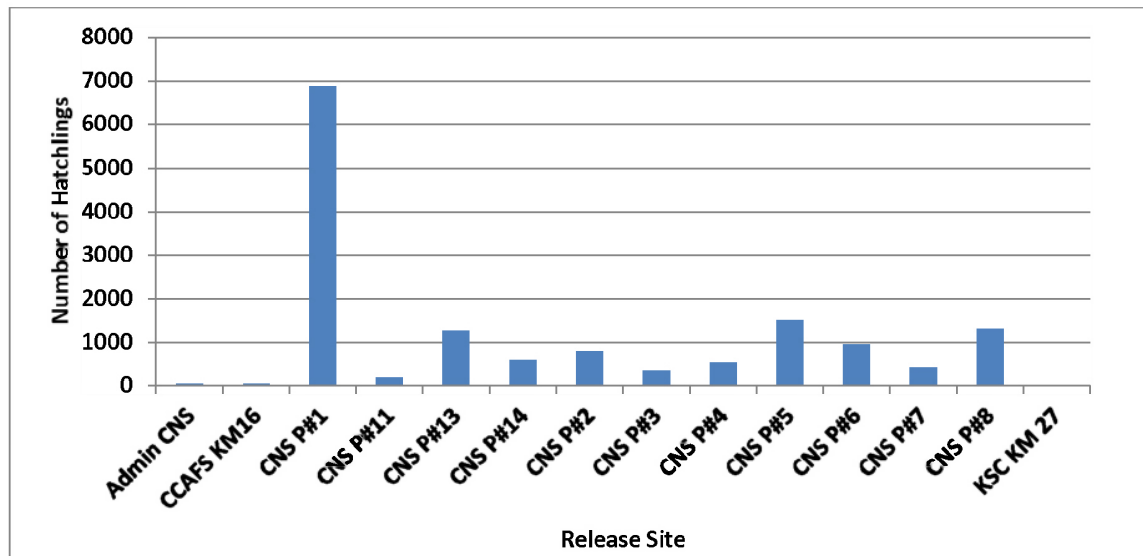


Figure 7. The total numbers of hatchlings released at each of the release sites over the course of this effort.



Hatching Success Inventories

A standard FWC nest inventory was conducted for each nest after five nights of emergences or at 70 days following deposition (note: some nests exceeded the targeted 70-day cutoff for initiating nest inventory to allow the NRDA team to collect samples). In a few cases, we discovered live eggs within a nest after five or more days of emergences; these were reburied to further incubate and emerge, thus delaying the inventory. Results from nest inventories are provided in Appendix B.

Sea turtle nest incubation period (I) is defined as the number of days from the date that the nest is deposited (D) until the date of first emergence (E) of hatchlings. All viable eggs and hatchlings within a nest do not hatch or emerge simultaneously. This was quite common in the confines of the facility where nests were closely monitored under controlled conditions each day.

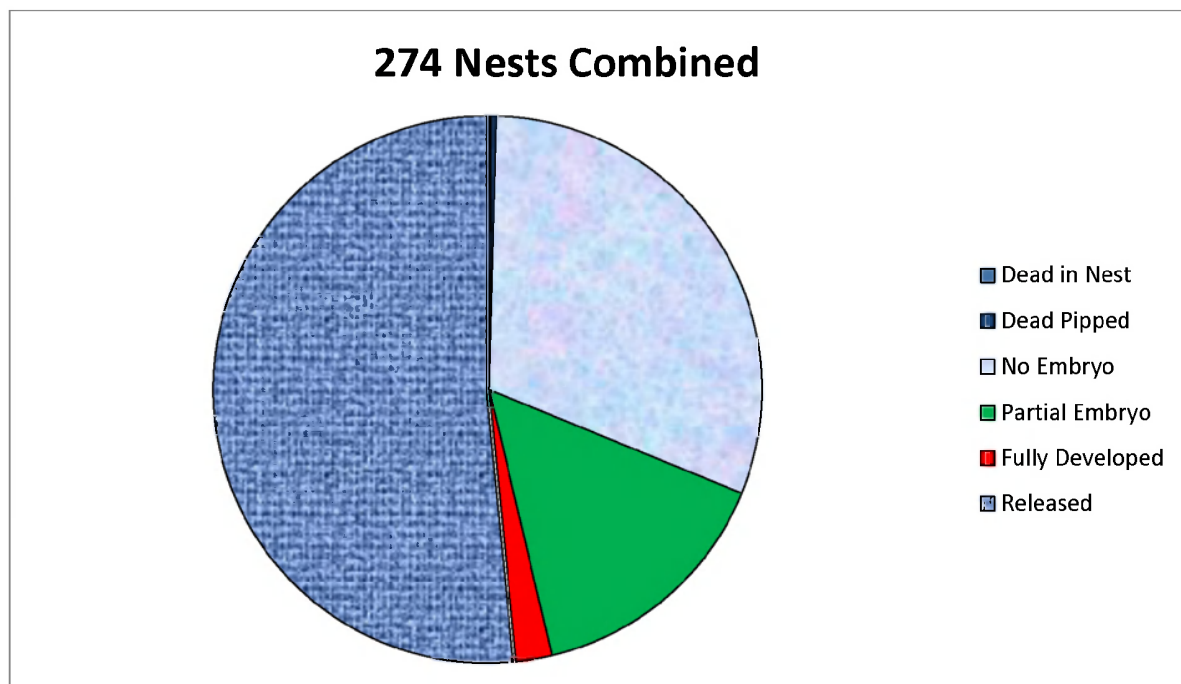
Additionally, the translocated nests were not subject to the full complement of sand typically overlaying an *in situ* nest (30 cm or so on a beach vs. 7 cm in the nest boxes). The reduction in the depth of sand covering the nest likely reduced the time for hatchlings to make their way to the surface.

A total of 195 of the 274 nests at the incubation facility had some hatch success: 189 were loggerhead nests, 4 were green turtle nests, and 2 were Kemp's ridley nests. The 189 loggerhead nests that had hatch activity had a mean incubation span of 55.3 days. The range in days

between the first and last release of loggerhead hatchlings ranged from 1-20 days. Loggerhead nest FL69 had the longest release time span, having its first release on 8/1/10 and its last release on 8/20/10. The mean incubation span for the four green turtle nests with hatching activity was 55 days, and the time range for these nests from first to last release was 4-12 days. Only two Kemp's ridley nests, FL1 and FL84, had any hatching success. The FL1 nest had an incubation of 63 days with 22 hatchlings released on 7/10/10 and 35 hatchlings on 7/12/10. Nest FL84 had four release dates from 7/29/10 through 8/1/10 and a total of 68 hatchlings. The incubation span for FL84 was 55 days. Incubation and release periods in the incubation facility were within normal values expected for *in situ* nests. The detailed release information for each of the 195 nests is found in Appendix B.

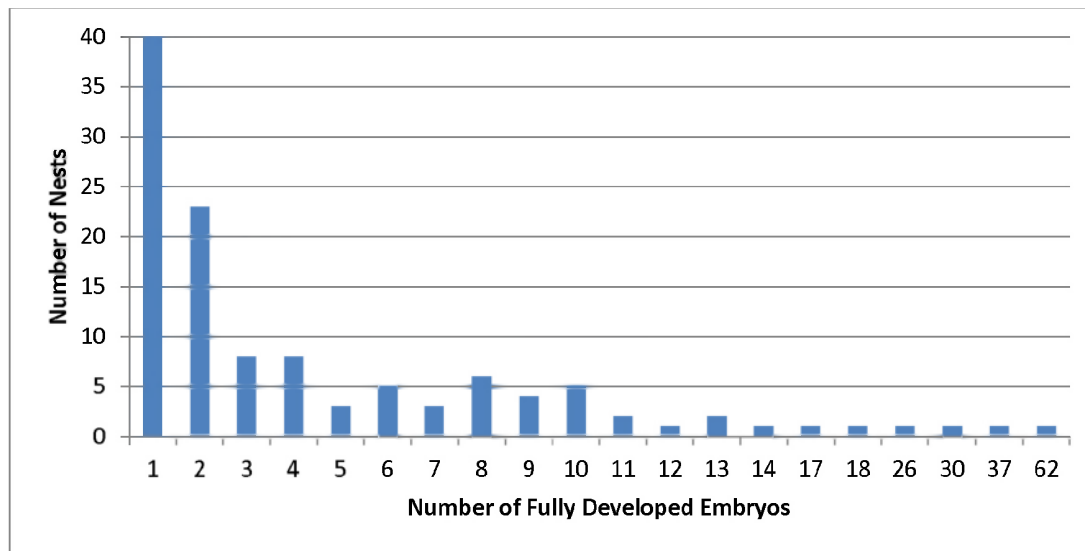
Combining all 274 nests (does not include FL68, which only included a single hatchling and no eggs), Figure 8 summarizes the resulting proportions of each FWC "egg inventory" category. This includes 79 nests that had no hatching success. Taking into account all 28,681 eggs (274 nests) delivered to KSC, the overall hatching success was 51.6% (14,796 eggs). About 30% of the unhatched eggs were non-viable (no embryo), and 2% of the eggs contained dead, fully developed embryos.

Figure 8. Summary of the egg success categories for all nests combined.



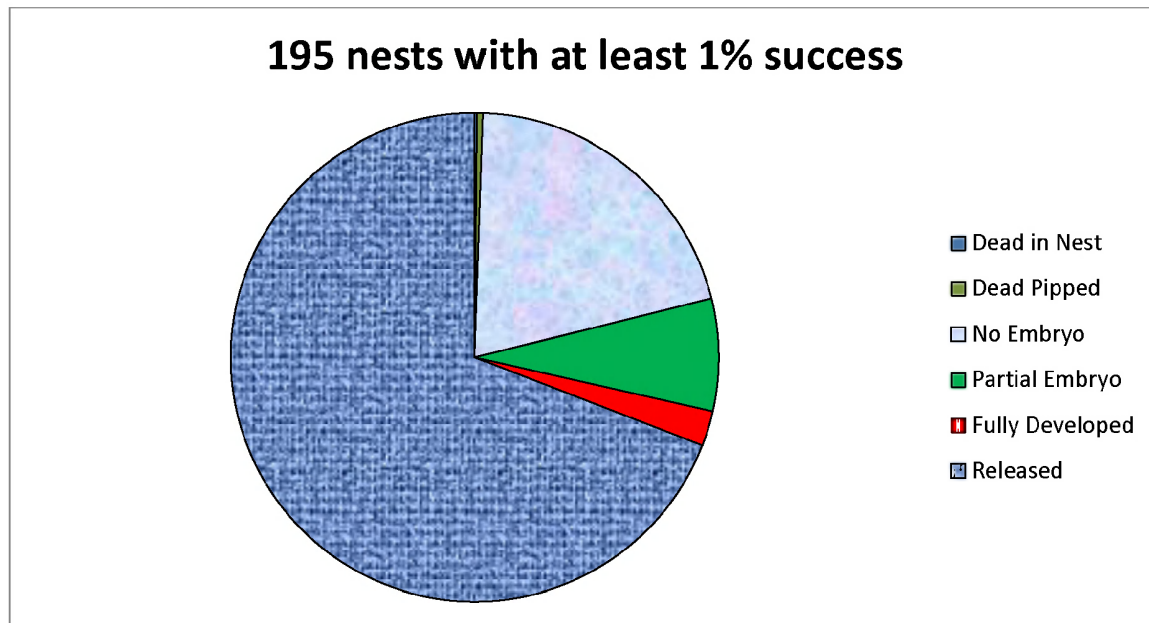
A total of 117 nests (43%) were found with at least one dead, fully developed embryo (Range =1-62 embryos). However, the frequency of this occurrence was relatively low as shown in Figure 9. A majority of these nests (n=82) contained five or fewer fully developed embryos.

Figure 9. Frequency of occurrence of fully developed, dead embryos from all nests.



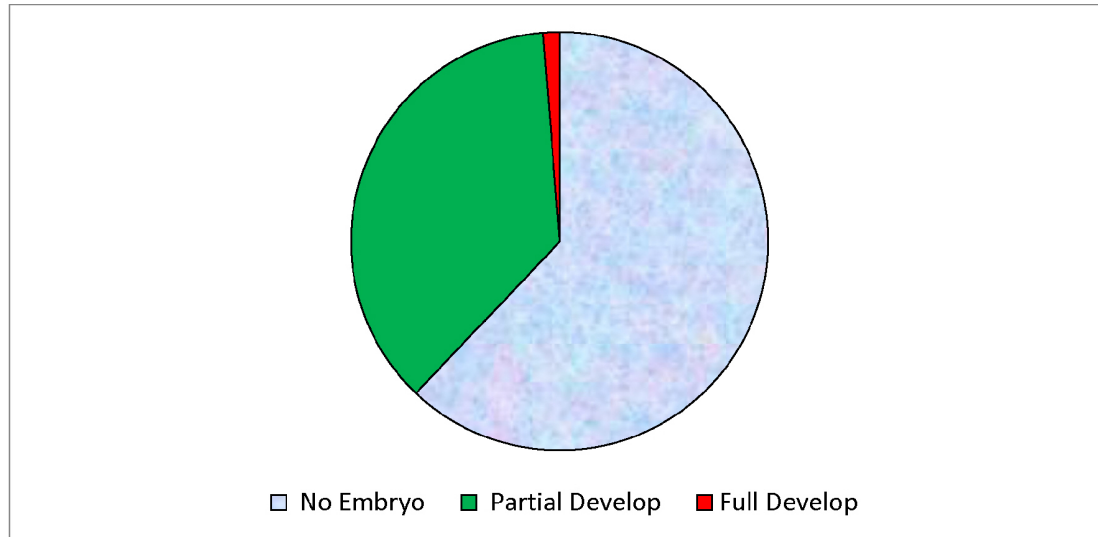
When evaluating only the 195 “productive” nests (those with at least 1% hatching success; does not include FL68), the overall “successful hatching” value is nearly 70%. The entire suite of categories is displayed in the pie chart in Figure 10. Also note the “partial embryo” category is about half that observed in Figure 9.

Figure 10. Distribution of egg development categories for the 195 nests that had any hatching success.



Focusing on the 79 failed nests (i.e., zero hatching success), the total egg count was 7,401 eggs. In 25 of these 79 failed nests, the “no embryo” category represented 90-100% of the eggs, indicating the nests were essentially non-viable before the translocation effort. The vast majority (99%) of the 7,401 eggs were either partially developed or had no discernable embryo. As shown in the pie chart in Figure 11, only 1% of the eggs were fully developed.

Figure 11. Distribution of egg development categories for all 79 nests that had no successful hatching.



Ultimately, only 12 nests that were total failures had any fully developed embryos within the unhatched eggs as shown in Figure 12. Nest FL8 had the highest number of fully developed embryos (50% of the eggs). This nest was deposited on 18 May and arrived at KSC on 13 July. However, we learned that the nest had been inundated by sustained over-wash on 7 July (day 50 of nest incubation period), see Figure 13. The fully developed embryos likely drowned within the nest on this particularly low lying beach on St Vincent Island, Florida. Similarly, data from the transport sheets indicated that FL224 was also over-washed at least once. We do not have insight to conditions at the other native nest sites for those shown in Figure 12. Several nests had been deposited along beaches with much organic material rather than sand; these nests often had strong odors suggesting fungal or bacterial action. In some cases these nests had some success and in other cases they had no success. This was observed for several nests from St. Vincent Island and St. George Island, Florida.

Figure 12. Frequency distribution of the embryo status within 12 nests that failed to have any hatching and contained fully developed, dead embryos.

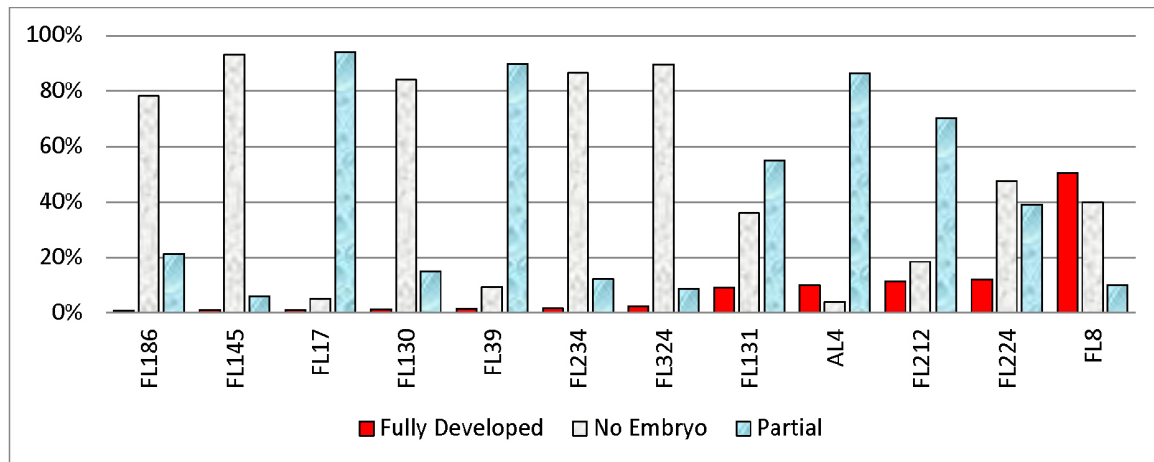


Figure 13. Photograph of nest FL8 inundated by tides on 7 July 2010, just one week prior to its excavation. Photograph courtesy of Robbin Trindell/FWC.



CONCLUSIONS

The goal of the sea turtle nest translocation effort was to prevent hatchlings that would normally emerge from northeastern Gulf of Mexico nests from entering oiled waters. This goal was achieved. While these actions were extraordinary, the protocols developed during this effort and the resulting outcomes provide a framework for discussion about future emergency response activities in cases of similar large-scale disasters. Taking into account all 28,681 eggs (274 nests), the overall hatching success was 51.6% (14,796 hatchlings). Individual nest success ranged from 0 to 100%.

Benchmarks for nest success under this “emergency translocation” circumstance do not exist. The closest datasets with which to compare our results are for *in situ* productivity. However, this comparison is complicated by: 1) limited available *in situ* productivity data; and 2) a distinct contrast in premise, as *in situ* nests remain on their natal beach for their full incubation, while the incubation facility nests were excavated from their natal beaches around day 50. The *in situ* success results look at nests that survived all the vagaries of the beach environment up to their full incubation term, while our incubation facility nests were protected once translocated. The incubation facility’s guarantee of protection against natural predation and weather-related impacts may be considered a bias toward success. That said, the incubation facility received some (partial) nests that were impacted at their respective beach (unquantified predation and over-washing, etc.); therefore, the full complement is not included in the success rate; it only represents the outcome for the remaining eggs that survived to be translocated.

According to the FWC turtle nesting data, there are two beaches in the Florida Panhandle for which consistent submissions of detailed productivity data are available at this time and represent 2005 to 2009. These two areas, Panama City Beach and St. George Island, had an average hatching success of 50% for loggerhead nests. This rate was calculated for all the nests that were marked for productivity assessment (n= 628), including those that had 0% hatching success due to predators or weather-related impacts. If only nests that had at least one egg hatch are included, the hatching success was 76%. A larger sample of nests evaluated for hatching success for this same time period at 17 beaches around Florida (including these two Panhandle beaches) had a hatching success rate for nests with at least one hatchling produced of 72% (S.D.=4.9, n = 8,084) (Dr. Anne Meylan, FWC, personal communication, January 2011).

The occurrence of fully developed, dead embryos would indicate development was ended in the late stages of embryonic growth, and the possibility that death occurred while the eggs were in transit or at the east coast incubation facility. However, fully developed dead embryos do occur within *in situ* nests and can result from various factors, including significant nest over-wash, invasive ants, bacterial and fungal invasions secondary to predation, etc. There were occurrences (2%) of fully developed dead embryos in this late-term translocation effort, but the causes are

unknown. Some likely resulted from events at the natal beach before translocation and others may have resulted from the translocation process, but there is no clear evidence of the latter. The extraordinary efforts to minimize the risks to embryonic development during translocation activities appear to have been largely successful. A total of 14,796 hatchlings were released into the Atlantic Ocean that would have otherwise faced an uncertain fate in the oiled Gulf of Mexico.

ACKNOWLEDGEMENTS

Special thanks go to the following dedicated individuals with tremendous can-do attitudes to get this work underway: Doug Husted, Nancy Fleming, Becky Bolt, Stephanie Weiss, Mark Provancha, Lynne Phillips, Robert Cummings, John Stiner, Paul Schmalzer, Carlton Hall, Doug Scheidt, and Ron Schaub. The primary night and morning teams were key to making releases successful and included Nick Migliore, Mallory Morgan, Aly Wilhelm, Bryan Smallwood, Becky Bolt, and Stephanie Weiss. Carly Garreau stepped in for many of the morning checks. Truck deliveries required an enthusiastic, strong, and flexible team that in addition to the above individuals included Mark Mercadante, Chris Schuman, and Resa Cancro. We thank Dianne Ingram and the “Alabama 5” for their visit and full day of support with nest assessments in the “hot-house”.

IHA’s leadership enthusiastically accepted this emergency project and for this we thank Cynthia Gross, Leroy Gross, Joanne Creech, Chuck Smallwood, and Vicki Lockard for their commitment. The rapid response of our NASA clients at KSC made this effort move forward at great speed and we are deeply appreciative to all, but especially to Denise Thaller, Burt Summerfield, John Knight, and John Shaffer. We thank Carol Donnelly in KSC Master Planning and the NASA-KSC Public Affairs Office, particularly MaryAnn Chevalier and Lisa Malone, for their team’s professional and flexible attitude related to photography of this effort.

We thank Sandy MacPherson, Barbara Schroeder, Lorna Patrick, Ann Marie Lauritsen, Robbin Trindell, Karen Frutchey, and Donna Shaver for their constant support, excellent communication, and responsiveness to all aspects of this effort. We recognize that we (on the Atlantic) were just one side of this particular effort with significant staff coordination required along the Gulf beaches and the numerous challenges there. USFWS, NOAA-Fisheries and FWC provided outstanding dedication to both aspects of this operation. Finally, Sandy MacPherson, Barbara Schroeder, and Anne Meylan provided thoughtful editorial comments to improve the drafts of this report.

LITERATURE CITED

Lutz, P.L., and J.A. Musick. 1997. The Biology of Sea Turtles. CRC Press International. 432pp.

Miller, J.D. 1985. Embryology of Marine Turtles. In: Gans, C., F. Billett, and P. Maderson (editors). Biology of the Reptilia, Development A. Vol. 14. John Wiley and Sons, New York. pp. 269-328.

APPENDIX A

Notifications, Memorandums and Permits



United States Department of the Interior

FISH AND WILDLIFE SERVICE

1875 Century Boulevard
Atlanta, Georgia 30345

In Reply Refer To:
FWS/R4/ES

- JUN 25 2010

Memorandum

To: ES Field Supervisors — Jacksonville, Panama City, and Daphne

From: -Assistant Regional Director - Ecological Services

Subject: Emergency Endangered Species Act Section 7 Consultation to implement Sea Turtle Late-Term Nest Collection and Hatching Release Protocols for the Florida Panhandle and Alabama in Re-grinn-P to the Deepwater Horizon Incident

In 2001, the U.S. Coast Guard, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service (Service), National Marine Fisheries Service, National Ocean Service, and the Office of Environmental Policy and Compliance at the Department of Interior signed an Interagency Memorandum of Agreement (MOA) regarding oil spill planning and response activities under the Federal Water Pollution Control Act's National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act (attached). In accordance with the MOA and oil spill response actions, as part of emergency consultation, the Services shall provide the Federal On-Scene Coordinator with any timely recommendations to avoid and/or minimize impacts to listed species and critical habitat.

The Deepwater Horizon (MC-252) incident has placed most, if not all, of the 2010 Northern Gulf hatchling cohort of sea turtles (including Loggerhead (*Caretta caretta*), Kemp's Ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*)) at high risk of encountering oil and dying from exposure to oil toxins through direct contact and ingestion if allowed to enter Gulf waters. Based on this information representative of the

National Sea Turtle Recovery Coordinator, the National

Service, and the Florida Fish and Wildlife Conservation Commission, have recommended that nests produced on the Florida Panhandle and Alabama beaches be collected near the end of incubation and transported to the Atlantic Coast of Florida for final incubation and subsequent release of hatchlings into the Atlantic Ocean (attached). The Service's Panama City, Jacksonville, and Alabama Field Offices have concurred with the recommendation. The decision

TAK E PRIDE
AMERICA



to release hatchlings into the Atlantic Ocean as opposed to another location in the Gulf was made for several reasons. First, we know from previous research that some of these hatchlings will end up being transported into the Atlantic Ocean by the gulfstream. Therefore, this one time event is not anticipated to upset the genetic identities of the sea turtle populations. In addition, given uncertainty related to the distribution of oil within the gulf in the future, a release anywhere in the Gulf of Mexico may still put the hatchlings in harm's way. Therefore, we have decided that the safest course of action is to release the hatchlings into the Atlantic Ocean. We will continue to track the location of oil and the response efforts and adapt the recommendation as appropriate.

We have carefully assessed the attached protocol and concur that this action is necessary to prevent the imminent loss of the approximately 700 nests laid annually in the Florida Panhandle and up to 80 nests laid annually in Alabama, or some 50,000 hatchlings. This response is provided pursuant to the Endangered Species Act emergency section 7 consultation regulations (50 CFR §402.05) and the Memorandum of Agreement which recognize that oil spill response activities qualify as an emergency action and may require expedited consultation. In order to minimize take of listed sea turtles, the specific protocols for collection of eggs, handling, transport, incubation, release nntlinPid in the attached Plan shall be implemented. Following completion of the emergency we will complete section 7 consultation on this action.

Attachments



Marine Turtle Permit

Florida Fish and Wildlife Conservation Commission
Imperiled Species Management Section — Tequesta Field Laboratory
19100 SE Federal Highway
Tequesta, Florida 33469
(561) 575-5407

Jane A. Provancha
NASA - Innovative Health Applications
Mail Code IHA-022
Kennedy Space Center, Florida 32899
321-759-0935

Permit #: MTP-10-114-B
County: Brevard
Effective Date: 6/29/2010
Expiration Date: 1/31/2011

Is Authorized to: (1) conduct stranding/salvage activities; (2) tag turtles using external flipper tags; (3) tag turtles using PIT tags; (4) conduct public turtle watches; (5) maintain & display preserved specimens; (6) collect tissue samples for analyses; (7) conduct sonic tagging/tracking of juvenile green turtles; (8) conduct net capture; (9) collect blood samples; (10) conduct esophageal lavage; (11) conduct hatch success evaluations; (12) shield nests with light-blocking shield/screen; (13) handle nests translocated from Alabama & the Florida Panhandle in response to the Deepwater Horizon Oil Spill; (14) incubate translocated nests in individual containers in a secure location on NASA property in response to the Deepwater Horizon Oil Spill; (15) rescue and release hatchlings from nests translocated in response to the Deepwater Horizon Oil Spill; (16) conduct hatch success evaluations of nests translocated in response to the Deepwater Horizon Oil Spill.

Authorized Nesting Survey Area: None.

Permittee Signature _____ Date _____

Not valid unless signed. By signature, the permittee confirms that all information provided to issue the permit is accurate and complete, and indicates acceptance and understanding of the provisions and conditions listed below. **Any false statements or misrepresentations when applying for this permit may result in felony charges and will result in revocation of this permit.**

By signature, I acknowledge that I have read and understand this permit. Signature of this permit indicates that I and all authorized personnel listed below have read and agree to abide by all Florida Fish and Wildlife Conservation Commission (FWC) "Sea Turtle Conservation Guidelines" that pertain to the authorized activity(s) listed on this marine turtle permit. I understand that it is my responsibility to transmit all future information updates to all authorized personnel listed on my permit. **Permittee must provide a signed copy of this permit to the FWC address above to activate this permit.**

Authorized by: Robbin Trindell, Ph.D., Biological Administrator, Imperiled Species Management

Authorizing Signature Ca l- k v ' e - l e # Date pne.,;2 0/d

Authorized Research Projects: (1) Relative abundance and distribution of marine turtles inhabiting Mosquito Lagoon, authorized 2/7/1995.



Marine Turtle Permit

Florida Fish and Wildlife Conservation Commission
Imperiled Species Management Section — Tequesta Field Laboratory
19100 SE Federal Highway
Tequesta, Florida 33469
(561) 575-5407

Authorized Monitoring Projects: None.

Authorized Personnel: S. Gann; K. Holloway-Adkins; B. Bolt; S. Weiss; E. Reyier; R. Lowers; D. Scheidt; C. Garreau; M. Mercadante; J. Shaffer; L. Phillips; A. Marriott; N. Migliore; P. Mukerjee.

General Conditions: Permitted individuals must adhere to the FWC marine turtle permit guidelines developed under a Section 6 Cooperative Agreement between FWC and the U.S. Fish and Wildlife Service.

Special Conditions: Sonic tracking may only be conducted passively via moored listening stations. All transfers of marine turtles or specimens into or out of the State of Florida must be accompanied by a specific consent permit from FWC.

The following special conditions are associated with Authorized Research Project #1:

1. Turtles held on the boat during hand capture and netting studies are to be protected from temperature extremes of heat and cold, provided adequate air flow, and kept moist (if appropriate) during sampling;
2. Turtles must be placed on pads for cushioning, preferably in containers, free of any material that could be accidentally ingested by the animal, to keep turtles off the hot deck and to separate individuals to prevent injury;
3. During release, turtles must be lowered as close to the water's surface as possible to prevent potential injuries;
4. Copies of all notifications, reports, and data summaries required by NOAA Permit #14655 shall also be copied to the FWC Tequesta office;
5. In the event that the numbers of turtles authorized for incidental take under NOAA Permit #14655 are exceeded, all research work shall cease immediately and notification sent to the FWC Tequesta office..

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Special Use Permit - 2010

Type: SEA TURTLES RELEASE

Date Prepared: Jul 01, 2010
Permit Expires: Oct 3, 2010

Long Term -----Permit # SERO CANA 5500 015

Short Term xx

Region Park Type Num

Name of Area:
Canaveral National Seashore

Jane Provancha OHF, Room 1104 Kennedy Space Center (321) 867-2434

Name of Permittee

is hereby authorized during the period from **6:00 am 01 Jul 2010, until 6:00 pm 31 Oct 2010**, to use the following described land or facilities in the above named area:

Canaveral National Seashore

For the purpose of:

Release of sea turtle hatchlings transplanted from Gulf of Mexico beaches.

Authorizing legislation or other authority (RE-NPS-53 Appendix 1): 36 CFR, Part 2, Sec. 2.50

NEPA Compliance: CATEGORICALLY EXCLUDED xx EA/FONSI _____ EIS _____ OTHER APPROVED PLANS _____

PERFORMANCE BOND: Required _____ Not Required X Amount \$ _____
LIABILITY INSURANCE: Required XX Not Required _____ Amount \$ _____

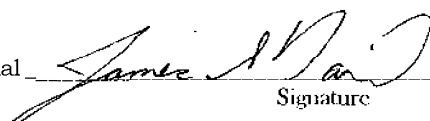
ISSUANCE of this permit is subject to the conditions on the appended pages and when appropriate to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of \$ 50A)0. (Fee Waived). The undersigned hereby accepts this permit subject to the terms, covenants, obligations, and reservations, expressed or implied herein. Permit does not include any exclusive park staff services or event management. This permit does NOT waive park entrance fees for event guests or participants.


PERMITTEE-----

Signature

Date

Authorizing Official


Signature

 41, J7/2
Title Date

PERMITTEE



United States Department of the Interior

NATIONAL PARK SERVICE
Canaveral National Seashore
212 South Washington Ave.
Titusville, Florida 32796



N1621 (CANA)

July 1, 2010

Jane Provancha
Innovative Health Applications
Medical Environmental Support Contract
Mail Stop: IHA-005
OIIF, Rm 1104
Kennedy Space center, FL 32815

Dear Ms. Provancha:

We have reviewed your request to release sea turtle hatchlings from northern Gulf of Mexico beaches at Canaveral National Seashore. Due to the effects of the Mississippi Canyon 252 Oil Spill and after consultations with National Park Service, U.S Fish and Wildlife Service and Florida Fish and Wildlife Conservation Commission experts on sea turtle conservation, Canaveral National Seashore grants permission to release subject sea turtles on its beach. A Special Use Permit is attached authorizing that activity.

The normal processing fee is waived because of the beneficial effects on federally-listed species. The Please contact John Stiner, our Resource Management Specialist at 321-267-1110 to work out details on the implementation process.

Sincerely,

James S. David
Acting Superintendent

Attachment

TAKE PR ID
IN AM E RICA

United States Department of the Interior
U.S. Fish and Wildlife Service
Special Use Application and Permit

2. Application Date July 2, 2010

3. Period of Use Applying for:

1. Merritt Island

National Wildlife Refuge From: Jul 2, 2010

To: November 30, 2010

4. Applicant Information:

Name: Jane A. Provancha Phone: 321.867.2434
Organization: Innovative Health Applications LLC Fax: 321.867.7050
Address: Mail Stop: IHA-00S email: jiane.a.provancha@nasa.gov
City/State/ZIP: Kennedy Space Center, FL 32815

5. Purpose of the Permit

Application: ☒ Agriculture

Commercial Activities

Research/Monitoring

☐ Commercial Visitor Services

Commercial Filming

☐ Special Event

15 ☒ Other (describe)

"Release of Gulf Coast sea turtle hatchlings

6. Describe the above activity as specifically as you can.

Include: Where the activity will take place (units, roads, trails); When (seasons, days, hours); How (methods, techniques, transportation); Frequency (one time only, daily, occasionally); Number of people/vehicles/boats; Special Needs/accesses
Researchers may be required to supply a research Proposal.

To minimize impacts to sea turtles in AL and FL resulting from the Deepwater Horizon (MC-252) oil spill, sea turtle eggs from nests along the coasts of AL and the FL panhandle will be moved prior to hatching. The eggs will be transported to a facility on KSC Protocol for incubating eggs and release will follow approved scope-of-work. Following emergence, the hatchlings will be released along the coast of FL, including 6-miles of beach within the Merritt Island NWR. IHA personnel will release the turtles as soon as possible after emergence. Hatchling release shall occur at designated locations along the central east Florida coast. Release locations shall be on a relatively dark beach without light sources directly visible from the beach. Releases will occur between 2am and sunrise. At the time of release, hatchlings will be placed just landward of the surf zone and allowed to crawl the short distance to the water on their own. Artificial lights shall not be used during hatchling releases. Individuals conducting the hatchling release should conduct a brief search of the surf zone and of the surf zone and shallow water adjacent to the beach 10-15 minutes following release to ensure that all hatchlings have departed.

Print Form

8. Applicant Signature:

Jane A. Provancha

Date:

July 2, 2010

Print this form and return it to the refuge for processing. Do not fill out any information below this line.

For Official Use Only		Application approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Special Conditions	See attached.	Slat on Number 41570
		Permd Number 2010 sup 008
Record of Payments:	<input checked="" type="checkbox"/> Payment exempt <input type="checkbox"/> Partial payment <input type="checkbox"/> Full payment	
	Amount of payment:	Ref:ord of partial payments:
This permit is issued by the U.S. Fish and Wildlife Service and accepted by the above signed, subject to the terms, covenants, obligations, and reservations imposed.		
Permit Approved and Issued By: (name and title)		Date: <i>July 2, 2010</i>
<i>Laurel J. Hurdman, Refuge Manager</i>		

FWS Form 3-1383 (Rev. 01/08)

OWB Control No. 10YE-11121 Expires 04/30/2011

DWH-AR0021343

**United States Department of the Interior
U.S. Fish and Wildlife Service
Special Use Application and Permit**

2. Application Date July 2, 2010

3. Period of Use Applying for:

Archie Carr

National Wildlife Refuge From: (Jul 2, 2010

To: November 30, 2010

4. Applicant Information:

Name Jane A. Provancha

Phone: 1321.867.2434

Organization: Innovative Health Applications LLC

Fax: 321.867.7050

Address: Mail Stop: IHA-005

email jone.a.provancha@nasa.gov

City/State/ZIP Kennedy Space Center, FL 32815

5. Purpose of the Permit Application:

☐ Agriculture
☐ Commercial Activities
☐ Research/monitoring

☐ Commercial Visitor Services
☐ Commercial Filming
☐ Special Event

☒ Other (describe)
r
(Release of Gulf Coast sea turtle hatchlings)

6. Describe the above activity as specifically as you can.

Include: Where the activity will take place (units, roads, trails); When (seasons, days, hours); How (methods, techniques, transportation); Frequency (one time only, daily, occasionally); Number of people/vehicles/boats; Special Needs/access
Researchers may be required to supply a research proposal.

To minimize impacts to sea turtles in AL and FL resulting from the Deepwater Horizon (MC-252) oil spill, sea turtle eggs from nests along the coasts of AL and the FL panhandle will be moved prior to hatching. The eggs will be transported to a facility on KSC. Protocol for incubating eggs and release will follow approved scope-of-work. Following emergence, the hatchlings will be released along the coast of FL, including beaches within the Archie Carr NWR. IHA personnel will release the turtles as soon as possible after emergence. Hatchling release shall occur at designated locations along the central east Florida coast. Release locations shall be on a relatively dark beach without light sources directly visible from the beach. Releases will occur between 2am and sunrise. At the time of release, hatchlings will be placed just landward of the surf zone and allowed to crawl the short distance to the water on their own. Artificial lights shall not be used during hatchling releases. Individuals conducting the hatchling release should conduct a brief search of the surf (zone and of the surf zone and shallow water adjacent to the beach 10-15 minutes following release to ensure that all hatchlings have

departed.

7. Print Form

8. Applicant Signature:

Date:

Print this form and return it to the refuge for processing. Do not fill out any information below this

For Official Use Only

Application approved: ☒ yes ☐ no

Station Number 41575

Permit Number 41575-2010-13

Record of Payments:

Payment exempt

☐ Partial payment

☒ Full payment

Amount of payment \$

Record of partial payments:

This permits issued by the U.S. Fish and Wildlife Service and accepted by the above signed, subject to the terms, conditions, and requirements appearing on the reverse

Permit Approved and Issued By: (Name and title)

Date: 7/7/10

Form 1 (01/08)

OMB Control No. 1018-0102 (expire: 04/30/2011)

DWH-AR0021344

21 June, 2010

TA-A3

TO: TA DFUM / D.Bent
FROM: TA-A3 / KSC Facility Utilization Officer (FUO)
SUBJECT: Space Assignment Letter No. 10-06-027, J6-2377, Entire Facility
(Totaling: 2162 sf)

• TEMPORARY SPACE ASSIGNMENT TO: TA DFUM / D. Bent

Effective immediately the subject space is TEMPORARILY assigned to the TA Directorate to be used by IHA for Holding and Care of Rescued Sea Turtle "Nests" in support of the BP Oil Spill Response per SR #10-SA0026, Log #248. The space shall be turned over to the KCS SPACE BANK upon expiration of the temporary assignment.

• SPACE ASSIGNMENT EXPIRATION: 28 December, 2010

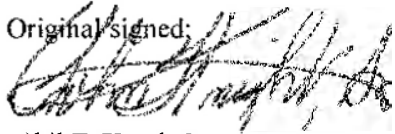
The Space Classification Code for this assignment is 57, OPERATIONAL. Any proposed changes to the Space Classification use shall be pre-approved by the KSC Facility Utilization Officer.

It is NOT MANDATORY to comply with KNPR 8830.1, Facilities and Real Property Management Procedural Requirements, Section 12 Physical Space Management rules and regulations in populating the subject area.

To obtain KEYS for the subject space please contact the TA Directorate Key Custodian / D. Bent at 861-4121.

For any questions regarding this matter, please contact John Knight at 867-9351 or Ramon Mejias at 867-7732, or email john.f.knight@nasa.gov

Original signed:



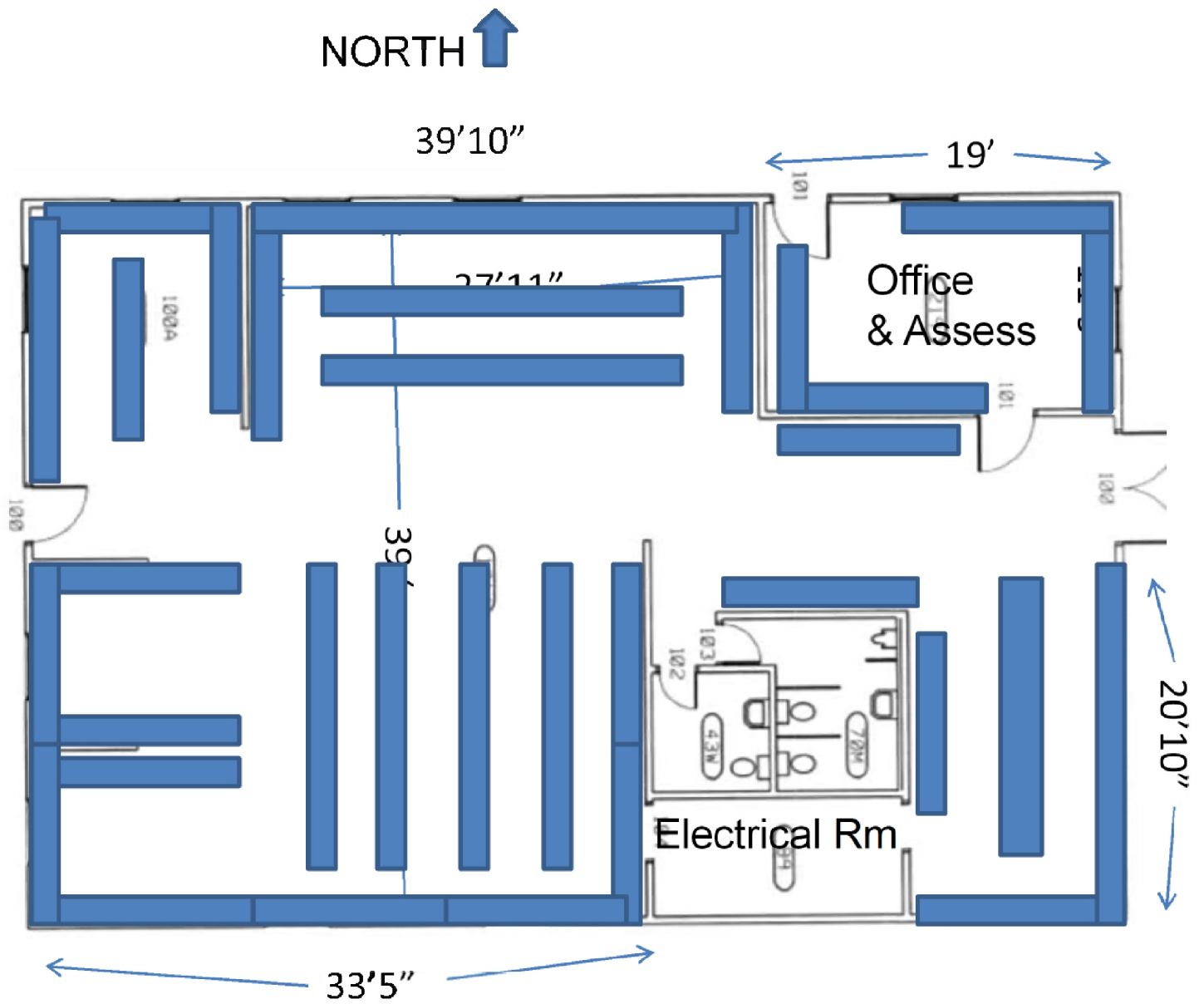
John F. Knight Sr.

cc:

TA-A3/R. Ponik
TA-A3/R. Mejias
TA-A3/J. Knight
TA-A3/D. Bent
TA-A3/S. Walsh
TA-AIM. Lavoie
PH/J. Creech TA-
B10/J. Shaffer

ISC-4027/M. Dixon
ISC-4026/S. Hopper
ISC-4026/C. Donnelly
ISC-4027/D. Henry
ISC-4027/L. Lopetz
LOCKSHOP/C. Barron
IHA-2100/D. Husted

KSC incubation facility layout with nest table positions throughout.



J -23779 CONTRACTOR SUPPORT BUILDING NO.

DWH-AR0021346

APPENDIX B

Inventory Data Collection Results

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
AL001	CC	126	0.97	122	0	0	3	0	1
AL002*	CC	96	0.94	90	0	1	4	0	1
AL003	CC	110	0.41	45	0	1	61	2	1
AL004*	CC	102	0.00	0	0	0	4	88	10
AL005	LK	125	0.00	0	0	0	122	3	0
AL006	CC	114	0.86	98	1	0	11	0	4
AL007	CC	87	0.00	0	0	0	24	63	0
AL008	CC	123	0.85	104	0	1	16	0	2
AL009*	CC	123	0.65	80	8	15	10	0	10
AL010	CC	107	0.23	25	0	0	78	3	1
AL012	CC	147	0.96	141	0	0	6	0	0
AL013	CC	90	0.87	78	0	0	11	0	1
AL016	CC	91	0.80	73	0	0	18	0	0
AL017	CC	122	0.84	102	0	1	13	6	0
AL018	CC	110	0.00	0	0	0	104	6	0
AL019*	CC	72	0.58	42	0	0	19	9	2
FL001	LK	66	0.86	57	0	1	4	2	2
FL002	CC	122	0.00	0	0	0	6	116	0
FL003	CC	107	0.00	0	0	0	3	104	0
FL004	CC	126	0.00	0	0	0	56	70	0
FL005	CC	45	0.00	0	0	0	45	0	0
FL006	CC	141	0.04	5	1	0	12	123	0
FL007	CC	130	0.00	0	0	0	13	117	0
FL008	CC	123	0.00	0	0	0	49	12	62
FL009	CC	113	0.92	104	0	0	8	0	1
FL010	CC	140	0.00	0	0	0	7	133	0
FL011	CC	78	0.00	0	0	0	48	30	0
FL012	CC	97	0.94	91	0	0	5	0	1
FL015*	CC	94	0.37	35	0	0	1	58	0
FL016	CC	140	0.87	122	0	1	12	2	3

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
FL017	CC	99	0.00	0	0	0	5	93	1
FL018	CC	70	0.00	0	0	0	1	69	0
FL019	CC	68	0.96	65	0	0	3	0	0
FL020	CC	139	0.39	54	1	1	31	49	3
FL021	CC	129	0.00	0	0	0	98	31	0
FL022	CC	121	0.78	94	0	0	27	0	0
FL024	CC	128	0.03	4	0	1	28	86	9
FL025	CC	133	0.97	129	1	0	1	1	1
FL026	CC	85	0.66	56	0	1	15	0	13
FL027	CC	115	0.03	3	0	0	3	107	2
FL028	CC	88	0.00	0	0	0	33	55	0
FL029	CC	131	0.00	0	0	0	28	103	0
FL030	CC	133	0.30	40	0	0	88	4	1
FL032*	CC	112	0.49	55	1	2	21	24	9
FL033	CC	103	0.68	70	0	0	9	6	18
FL034	CC	90	0.93	84	1	0	3	2	0
FL035	CC	126	0.00	0	0	0	66	60	0
FL036	CC	152	0.91	138	0	0	13	1	0
FL037	CC	89	0.00	0	0	0	69	20	0
FL038	CC	137	0.69	94	0	0	30	12	1
FL039	CC	77	0.00	0	0	0	7	69	1
FL040	CC	130	0.95	123	0	0	7	0	0
FL041	CC	128	0.94	120	0	0	7	0	1
FL043	CC	165	0.07	11	0	0	5	141	8
FL044	CC	91	0.98	89	0	0	2	0	0
FL045	CC	2	0.00	0	0	0	0	2	0
FL046	CC	77	0.00	0	0	0	10	67	0
FL047	CC	101	0.71	72	0	0	27	2	0
FL048	CC	116	0.77	89	0	0	27	0	0
FL049	CC	89	0.99	88	0	0	1	0	0

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
FL050	CC	58	0.00	0	0	0	47	11	0
FL051	CC	135	0.07	9	0	0	13	109	4
FL052	CC	78	0.00	0	0	0	23	55	0
FL053	CC	145	0.26	38	0	0	51	49	7
FL054	CC	113	0.81	92	1	2	7	8	3
FL055*	CC	99	0.79	78	1	0	6	2	12
FL056	CC	110	0.00	0	0	0	100	10	0
FL058	CC	92	0.96	88	0	1	3	0	0
FL060	CC	47	0.38	18	1	0	28	0	0
FL065	CC	131	0.99	130	0	0	1	0	0
FL066	CC	84	0.02	2	0	0	82	0	0
FL067	CC	106	0.92	97	0	0	5	2	2
FL068*	CC	N/A	hatchling	1	0	0	0	0	0
FL069	CC	209	0.75	156	0	0	42	3	8
FL070	CC	139	0.56	78	1	8	7	8	37
FL071	CC	138	0.86	118	0	0	12	6	2
FL072	CC	90	0.27	24	0	0	64	2	0
FL073	CC	93	0.94	87	0	0	6	0	0
FL074	CC	96	0.00	0	0	0	83	13	0
FL075*	CC	75	0.35	26	0	0	45	0	4
FL076	CC	102	0.30	31	0	1	40	25	5
FL080	CC	100	0.72	72	0	0	26	1	1
FL081	CC	80	0.84	67	0	1	10	2	0
FL082	CC	141	0.57	80	0	0	58	1	2
FL083	CC	155	0.20	31	3	4	63	48	6
FL084	LK	90	0.76	68	0	2	7	7	6
FL086	CC	91	0.27	25	0	1	63	2	0
FL087	CC	99	0.00	0	0	0	29	70	0
FL089	CC	99	0.00	0	0	0	23	76	0
FL090	CC	17	0.00	0	0	0	10	7	0

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
FL091	CC	104	0.66	69	0	1	8	0	26
FL092	CC	88	0.80	70	0	0	14	2	2
FL093	CC	93	0.00	0	0	0	33	60	0
FL094	CC	51	0.57	29	0	0	22	0	0
FL095	CC	99	0.81	80	0	0	14	2	3
FL096	LK	90	0.00	0	0	0	89	1	0
FL098	CC	127	0.11	14	3	1	41	58	10
FL099	CC	104	0.98	102	0	0	0	2	0
FL100	CC	129	0.53	68	0	0	57	1	3
FL101*	CC	108	0.81	88	0	1	11	0	8
FL102	CC	103	0.00	0	0	0	31	72	0
FL103	CC	96	0.99	95	0	0	1	0	0
FL104	CM	156	0.84	131	0	0	21	3	1
FL105	CC	92	0.00	0	0	0	82	10	0
FL106	CC	126	0.06	7	0	0	63	56	0
FL108*	CC	121	0.88	107	0	2	10	1	1
FL109	CC	112	0.00	0	0	0	15	97	0
FL110	CC	106	0.00	0	0	0	7	99	0
FL111	CC	155	0.00	0	0	0	50	105	0
FL112	CC	120	0.91	109	0	1	8	2	0
FL113	CC	39	0.00	0	0	0	39	0	0
FL114	CC	112	0.93	104	0	0	7	1	0
FL115	CC	110	0.26	29	0	0	31	41	9
FL116	CC	88	0.86	76	0	0	8	4	0
FL117	CC	90	0.77	69	0	0	17	4	0
FL119	CC	145	0.94	137	0	0	8	0	0
FL121	CC	92	0.88	81	0	1	10	0	0
FL122	CC	55	1.00	55	0	0	0	0	0
FL123	CC	84	0.96	81	0	0	3	0	0
FL124	CC	80	0.11	9	0	0	64	7	0

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
FL125	CC	28	0.75	21	0	0	4	1	2
FL126	CC	121	0.88	107	0	2	2	3	7
FL127	CC	198	0.99	196	0	0	2	0	0
FL128	CC	112	0.00	0	0	0	89	23	0
FL129	CC	117	0.03	4	0	0	88	25	0
FL130	CC	81	0.00	0	0	0	68	12	1
FL131	CC	100	0.00	0	0	0	36	55	9
FL132	CC	132	0.00	0	0	0	54	78	0
FL133	CC	68	0.84	57	0	0	11	0	0
FL134	CC	71	0.00	0	0	0	10	61	0
FL135	CC	114	0.77	88	0	0	20	4	2
FL136	CC	112	0.97	109	0	0	2	1	0
FL137*	CC	81	0.68	55	0	0	15	0	11
FL138	CC	123	0.00	0	0	0	85	38	0
FL139	CC	126	0.83	105	0	0	20	0	1
FL140	CC	83	0.00	0	0	0	44	39	0
FL141	CC	29	0.24	7	0	0	21	0	1
FL142	CC	105	0.00	0	0	0	105	0	0
FL143	CC	129	0.31	40	0	0	85	0	4
FL144	CC	60	0.93	56	0	0	3	0	1
FL145*	CC	101	0.00	0	0	0	94	6	1
FL146	CC	92	0.66	61	0	0	15	2	14
FL147	CC	80	0.84	67	0	0	9	2	2
FL150*	CC	27	0.00	0	0	0	27	0	0
FL151	CC	37	0.00	0	0	0	33	4	0
FL152	CC	144	0.94	135	0	0	7	2	0
FL153	CC	86	0.97	83	0	0	2	1	0
FL154	CC	6	0.00	0	0	0	6	0	0
FL155	CC	95	0.79	75	0	0	17	2	1
FL156	CC	68	0.00	0	0	0	55	13	0

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
FL157	CC	129	0.71	92	0	0	34	2	1
FL159	CC	95	0.96	91	0	0	2	2	0
FL160	CC	96	0.09	9	0	0	85	0	2
FL161	CC	73	0.01	1	0	0	57	14	1
FL162	CC	118	0.79	93	0	0	16	7	2
FL163	CC	115	0.00	0	0	0	93	22	0
FL164	CC	107	0.86	92	0	0	11	2	2
FL165	CC	133	0.94	125	2	0	0	0	6
FL166	CC	78	0.69	54	0	0	15	7	2
FL167*	CC	131	0.90	118	0	0	13	0	0
FL168	CC	91	0.84	76	0	1	11	3	0
FL169	CC	105	0.66	69	0	0	28	4	4
FL170	CC	126	0.79	99	0	0	24	2	1
FL172	CC	122	0.53	65	0	2	54	0	1
FL173	CC	110	0.00	0	0	0	110	0	0
FL174	CC	88	0.95	84	0	0	4	0	0
FL175	CC	158	0.99	156	0	0	2	0	0
FL176	CC	101	0.99	100	0	0	0	1	0
FL177	CC	114	0.92	105	0	0	6	3	0
FL178	CC	113	0.87	98	1	0	10	4	0
FL179	CC	135	0.95	128	0	0	5	2	0
FL180	CC	104	0.97	101	0	0	3	0	0
FL181	CC	85	0.93	79	0	0	3	2	1
FL182	CC	137	0.31	42	1	4	74	8	8
FL183	CC	153	0.55	84	0	0	57	11	1
FL184	CC	71	0.93	66	0	0	1	4	0
FL185	CC	114	0.90	103	0	0	5	5	1
FL186	CC	132	0.00	0	0	0	103	28	1
FL187	CC	118	0.92	109	0	0	7	1	1
FL188	CC	115	0.93	107	0	1	3	4	0

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
FL189	CC	104	0.22	23	0	0	59	21	1
FL190	CC	98	0.84	82	0	0	9	5	2
FL191	CC	94	0.67	63	2	4	4	13	8
FL192	CC	109	0.63	69	0	0	24	5	11
FL193	CC	14	0.71	10	0	0	0	4	0
FL194	CC	100	0.87	87	0	0	13	0	0
FL195	CC	149	0.72	107	0	2	35	4	1
FL196	CC	94	0.88	83	0	1	5	5	0
FL205*	CC	58	0.00	0	0	0	46	12	0
FL206	CC	118	0.00	0	0	0	112	6	0
FL207	CC	82	0.00	0	0	0	11	71	0
FL209	CC	109	0.00	0	0	0	105	4	0
FL210	CC	120	0.38	46	0	1	60	9	4
FL212	CC	87	0.00	0	0	0	16	61	10
FL213	CC	66	0.00	0	0	0	23	43	0
FL214	CC	97	0.96	93	0	1	0	2	1
FL215	CC	117	0.97	114	0	0	1	2	0
FL217	CC	162	0.00	0	0	0	152	10	0
FL218	CC	150	0.71	106	0	1	26	12	5
FL219	CC	101	0.92	93	0	0	4	3	1
FL220	CC	99	0.00	0	0	0	88	11	0
FL221	CC	106	0.90	95	0	0	8	3	0
FL222	CC	68	0.94	64	0	0	3	1	0
FL223	CC	75	0.00	0	0	0	68	7	0
FL224	CC	82	0.00	0	0	1	39	32	10
FL225	CC	144	0.47	67	0	0	46	27	4
FL226	CC	88	0.59	52	0	0	29	7	0
FL230	CC	109	0.00	0	0	0	102	7	0
FL231	CC	98	0.11	11	0	0	73	6	8
FL232	CM	152	0.84	127	0	0	21	0	4

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
FL233	CC	105	0.00	0	0	0	98	7	0
FL234	CC	66	0.00	0	0	0	57	8	1
FL235	CM	139	0.96	133	0	0	0	6	0
FL238	CC	64	0.70	45	0	0	12	7	0
FL239	CC	145	0.99	143	0	0	2	0	0
FL240	CC	99	0.02	2	0	0	97	0	0
FL241	CC	129	0.84	108	0	0	10	10	1
FL242	CC	119	0.66	78	1	1	28	4	7
FL244	CC	112	0.00	0	0	0	112	0	0
FL245	CC	119	0.29	35	0	0	80	1	3
FL246	CC	51	0.00	0	0	0	43	8	0
FL247	CC	116	0.34	40	0	0	70	6	0
FL248	CC	97	0.00	0	0	0	77	20	0
FL249	CC	112	0.00	0	0	0	110	2	0
FL250	CC	81	0.00	0	0	0	81	0	0
FL251	CC	119	0.13	15	0	0	99	5	0
FL252	CC	112	0.94	105	0	1	0	6	0
FL253	CC	84	0.98	82	0	0	0	2	0
FL254	LK	112	0.00	0	0	0	110	2	0
FL256	CC	185	0.94	173	0	0	6	6	0
FL257	CC	104	0.98	102	0	0	0	0	2
FL259	CC	107	0.01	1	0	0	105	1	0
FL260	CC	109	0.29	32	0	1	50	20	6
FL270	CC	89	0.52	46	0	1	7	5	30
FL272	CC	84	0.56	47	0	0	29	6	2
FL273	CC	147	0.91	134	0	0	3	5	5
FL274	CC	139	0.93	129	0	0	6	4	0
FL282	CC	118	0.92	109	0	0	5	4	0
FL283	CC	133	0.00	0	0	0	113	20	0
FL284	CC	125	0.02	3	1	0	101	18	2

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
FL285	CC	133	0.89	119	0	0	5	6	3
FL286	CC	87	0.00	0	0	0	81	6	0
FL287	CC	113	0.47	53	0	1	39	7	13
FL288	CC	102	0.92	94	0	0	1	5	2
FL289	CC	79	0.01	1	0	0	78	0	0
FL292	CM	133	0.48	64	0	3	39	10	17
FL293	CC	86	0.93	80	0	0	0	4	2
FL294	CC	76	0.88	67	0	0	5	3	1
FL295	CC	89	0.85	76	0	1	7	5	0
FL296	CC	109	0.96	105	0	0	2	2	0
FL297	CC	125	0.14	17	0	0	105	1	2
FL311	CC	109	0.94	103	0	0	1	5	0
FL312	CC	103	0.24	25	0	0	67	5	6
FL313	CC	122	0.00	0	0	0	122	0	0
FL314	CC	78	0.95	74	0	0	0	4	0
FL315*	CC	81	0.00	0	0	0	77	4	0
FL316	CC	99	0.89	88	0	0	6	5	0
FL317	CC	104	0.94	98	0	0	5	1	0
FL324	CC	94	0.00	0	0	0	84	8	2
FL325	CC	58	0.60	35	0	0	21	2	0
FL326	CC	138	0.88	122	0	0	7	8	1
FL327	CC	140	0.00	0	0	0	126	14	0
FL346	CC	131	0.92	120	0	0	7	4	0
FL347	CC	104	0.91	95	0	0	3	3	3
FL348	CC	112	0.91	102	0	0	9	0	1
FL350	CC	116	0.90	104	0	0	6	6	0
FL375	CC	132	0.93	123	0	0	6	3	0
FL521	CC	28	0.00	0	0	0	17	11	0
FL540	CC	116	0.97	112	0	0	0	4	0
FL548	CC	122	0.84	102	0	1	19	0	0

Nest IDs	SPP	Egg Count at Inventory	Nest Success Ratio	Hatchlings Released	Dead in Nest	Dead Pipped	No Embryo	Partial Embryo	Fully Developed Embryo
FL553	CC	134	0.01	1	0	0	130	3	0
FL579	CC	40	0.73	29	1	0	4	6	0
FL580	CC	109	0.97	106	0	0	0	3	0
FL581	CC	101	0.90	91	0	1	1	8	0
FL6181	CC	132	0.81	107	0	0	24	1	0

***Asterisks above indicate notes as described below:**

AL2- Fully developed twins were observed in one egg

AL4- Green coloring observed around eggs

AL9- 5 eggs marked "Live Pipped", 1 eggs marked "Fully Developed" reburied

FL101- Hatchling marked "Live in Nest" is an albino

FL108-"Partial Embryo" and "Fully developed" were infested with maggots

FL137- One "Live in Nest" was an albino

FL145- Pink and purple coloring observed within eggs

FL15- Notation by excavator that 5 eggs lost due to coyote predation

FL167- Grass infestation

FL25- Advanced decomposition

FL315- One egg yokeless

FL32- Nine fully developed embryo observed as completely dehydrated with no yolk sacs

FL55- One egg was twins

FL68- One live hatchling

FL75- eight eggs infested with ants

APPENDIX B

Individual Nest Release Histories

Nest ID and totals followed by each date of releases and individual numbers per location

Sum of # Released		Column Labels															
NEST ID & Release Date	Admin	CCA	CNS	CNS	CNS	CNS	CNS	CNS	CNS	CNS	CNS	CNS	CNS	CNS	CNS	KSC	Grand
		FS	KM1	P#1	P#11	P#13	P#14	P#2	P#3	P#4	P#5	P#6	P#7	P#8	KM	Total	
AL1		10	112														122
17-Jul			18														18
18-Jul			38														38
19-Jul			56														56
20-Jul		8															8
21-Jul		2															2
AL10			16					2			1	6					25
13-Aug			3														3
14-Aug			11														11
15-Aug								2									2
16-Aug			2														2
17-Aug												6					6
18-Aug										1							1
AL12			75					41		2	23						141
13-Aug			5														5
14-Aug			38														38
15-Aug								41									41
16-Aug			32														32
17-Aug												23					23
18-Aug										2							2
AL13			56					13			9						78
14-Aug			8														8
15-Aug								13									13
16-Aug			48														48
17-Aug												9					9
AL16			41			1		30		1							73
12-Aug						1											1

14-Aug	13					13
15-Aug		30				30
16-Aug	28					28
18-Aug				1		1
AL17	101			1		102
19-Aug	10					10
20-Aug	65					65
21-Aug	24					24
22-Aug				1		1
23-Aug	1					1
25-Aug	1					1
AL19	36	1	5			42
15-Aug		1				1
19-Aug	2					2
20-Aug	20					20
21-Aug	12					12
22-Aug			5			5
23-Aug	2					2
AL2	24	43	22		1	90
20-Jul	1					1
21-Jul	23					23
22-Jul	43					43
23-Jul			22			22
24-Jul					1	1
AL3	26	1	4	1	13	45
29-Jul		1				1
30-Jul			3			3
31-Jul	22					22
1-Aug					13	13
2-Aug	4					4
3-Aug			1			1
4-Aug				1		1
AL6	57	18		1	22	98
30-Jul			13			13

31-Jul	36						36
1-Aug						22	22
2-Aug	21						21
3-Aug		5					5
4-Aug				1			1
AL8	1		39	33		31	104
7-Aug			8				8
8-Aug						31	31
9-Aug			31				31
10-Aug				33			33
11-Aug	1						1
AL9	38		17			1 24	80
5-Aug						24	24
6-Aug	38						38
7-Aug			16				16
8-Aug						1	1
9-Aug			1				1
FL1			22			35	57
10-Jul			22				22
12-Jul						35	35
FL100	62	5				1	68
31-Jul	3						3
1-Aug						1	1
2-Aug	59						59
3-Aug		5					5
FL101	4	43	4	22	3	12	88
2-Aug	1						1
3-Aug		43					43
4-Aug				22			22
5-Aug						12	12
6-Aug	2						2
7-Aug			2				2
8-Aug					3		3
9-Aug			2				2

11-Aug	1					1
FL103		59		36		95
7-Aug		8				8
8-Aug				36		36
9-Aug		51				51
FL104	30	4	73	1	23	131
4-Aug			73			73
5-Aug					23	23
6-Aug	29					29
7-Aug		4				4
8-Aug				1		1
16-Aug	1					1
FL106	4	3				7
15-Aug		3				3
16-Aug	4					4
FL108	51	2	10	44		107
1-Aug				7		7
4-Aug			10			10
5-Aug				37		37
6-Aug	51					51
7-Aug		2				2
FL112	4		46	59		109
4-Aug			46			46
5-Aug				59		59
6-Aug	4					4
FL114	21	10	48	1	24	104
4-Aug			1			1
5-Aug				24		24
6-Aug	21					21
7-Aug		10				10
10-Aug			48			48
FL115	11	7	2	9		29
4-Aug			2			2
5-Aug				9		9

6-Aug			9					9
7-Aug					7			7
11-Aug			2					2
FL116			43	1	27		5	76
8-Aug							5	5
9-Aug					27			27
11-Aug			43					43
12-Aug				1				1
FL117			40	29				69
11-Aug			30					30
12-Aug				29				29
13-Aug			9					9
14-Aug			1					1
FL119			81	48	8			137
11-Aug			31					31
12-Aug				48				48
13-Aug			34					34
14-Aug			16					16
15-Aug					8			8
FL12	39	2	12	29			9	91
21-Jul		2						2
22-Jul			3					3
23-Jul				29				29
24-Jul	39						9	48
25-Jul			7					7
26-Jul			2					2
FL121			12		23	2	44	81
6-Aug			12					12
7-Aug					20			20
8-Aug							44	44
9-Aug					3			3
10-Aug						2		2
FL122						50	5	55
4-Aug						50		50

5-Aug						5	5
FL123		15		57		9	81
3-Aug		15					15
4-Aug				57			57
5-Aug						9	9
FL124			7			2	9
7-Aug			4				4
8-Aug						2	2
9-Aug			3				3
FL125			4	6	10	1	21
8-Aug						1	1
9-Aug				6			6
10-Aug					10		10
12-Aug			4				4
FL126	3	12	6	31	2	53	107
3-Aug		12					12
4-Aug				31			31
5-Aug						53	53
6-Aug	3						3
7-Aug			4				4
8-Aug						2	2
9-Aug			2				2
FL127	64	14	39	3	7	69	196
3-Aug		14					14
4-Aug				3			3
5-Aug						69	69
6-Aug	64						64
7-Aug			38				38
8-Aug						7	7
9-Aug			1				1
FL129				4			4
10-Aug				4			4
FL133	2	25				30	57
3-Aug		25					25

5-Aug						30	30
6-Aug	2						2
FL135	60	1		1	26		88
15-Aug				1			1
16-Aug	54						54
17-Aug					26		26
19-Aug	6						6
24-Aug		1					1
FL136	54		38	1	16		109
9-Aug				1			1
10-Aug					16		16
11-Aug	53						53
12-Aug			38				38
13-Aug	1						1
FL137	42		13				55
12-Aug			13				13
13-Aug	18						18
14-Aug	23						23
21-Aug	1						1
FL139	39		63	1	2		105
10-Aug					2		2
11-Aug	26						26
12-Aug			63				63
13-Aug	13						13
15-Aug				1			1
FL141	5			1	1		7
15-Aug				1			1
16-Aug	5						5
17-Aug						1	1
FL143	15				4	21	40
16-Aug	8						8
17-Aug						21	21
18-Aug					4		4
19-Aug	5						5

20-Aug	1					1
21-Aug	1					1
FL144	8	2	36		10	56
7-Aug			2			2
8-Aug					10	10
9-Aug			34			34
11-Aug	8					8
12-Aug		2				2
FL146	26	7	5	22	1	61
8-Aug					1	1
9-Aug			5			5
10-Aug				22		22
11-Aug	26					26
12-Aug		7				7
FL147	14		13	39	1	67
8-Aug					1	1
9-Aug			13			13
10-Aug				39		39
11-Aug	13					13
19-Aug	1					1
FL15	19	7			9	35
24-Jul					2	2
26-Jul	12					12
27-Jul					7	7
28-Jul	7					7
29-Jul		7				7
FL152	30		103		2	135
6-Aug	29					29
7-Aug			103			103
8-Aug					2	2
11-Aug	1					1
FL153	5		36		42	83
6-Aug	4					4
7-Aug			32			32

8-Aug					42		42
9-Aug			4				4
11-Aug	1						1
FL155	65	9			1		75
11-Aug	12						12
12-Aug		9					9
13-Aug	42						42
14-Aug	11						11
17-Aug					1		1
FL157	43	36		13			92
10-Aug				13			13
11-Aug	32						32
12-Aug		36					36
13-Aug	11						11
FL159	46			23	1	21	91
14-Aug	12						12
15-Aug				23			23
16-Aug	34						34
17-Aug						21	21
18-Aug					1		1
FL16	55	28	4			35	122
27-Jul						35	35
28-Jul	51						51
29-Jul		28					28
30-Jul			4				4
31-Jul	3						3
2-Aug	1						1
FL160	7		1	1			9
12-Aug			1				1
13-Aug	5						5
14-Aug	2						2
15-Aug				1			1
FL161	1						1
20-Aug	1						1

FL162	45	35		1		12	93
22-Aug				1			1
23-Aug	7						7
24-Aug		35					35
25-Aug	38						38
26-Aug						12	12
FL164	62	1	24	3	2		92
12-Aug		1					1
13-Aug	2						2
14-Aug	32						32
15-Aug			24				24
16-Aug	28						28
17-Aug					2		2
18-Aug				3			3
FL165	96	29					125
11-Aug	4						4
12-Aug		29					29
13-Aug	91						91
14-Aug	1						1
FL166	21		6	10	17		54
14-Aug	9						9
15-Aug			6				6
16-Aug	9						9
17-Aug					17		17
18-Aug				10			10
19-Aug	2						2
20-Aug	1						1
FL167	39	25	13	39		2	118
8-Aug						2	2
9-Aug			13				13
10-Aug				39			39
11-Aug	38						38
12-Aug		25					25
14-Aug	1						1

FL168	36	17	2	21		76
9-Aug			2			2
10-Aug				21		21
11-Aug	35					35
12-Aug		17				17
13-Aug	1					1
FL169	2		33	9	25	69
7-Aug			5			5
8-Aug					25	25
9-Aug			28			28
10-Aug				9		9
14-Aug	2					2
FL170	8	2	34	55		99
9-Aug			34			34
10-Aug				55		55
11-Aug	7					7
12-Aug		2				2
13-Aug	1					1
FL172	32			33		65
18-Aug				33		33
19-Aug	4					4
20-Aug	19					19
21-Aug	8					8
25-Aug	1					1
FL174	67			10	7	84
16-Aug	35					35
17-Aug					7	7
18-Aug				10		10
19-Aug	31					31
20-Aug	1					1
FL175	117		11	15	13	156
14-Aug	2					2
15-Aug			11			11
16-Aug	100					100

17-Aug					13	13
18-Aug					15	15
19-Aug	10					10
20-Aug	5					5
FL176	65		27		8	100
13-Aug	2					2
14-Aug	26					26
15-Aug			27			27
16-Aug	37					37
17-Aug					8	8
FL177	2		14		89	105
6-Aug	1					1
7-Aug			14			14
8-Aug					89	89
21-Aug	1					1
FL178	4	3	43	43	5	98
8-Aug					5	5
9-Aug			43			43
10-Aug				43		43
11-Aug	4					4
12-Aug		3				3
FL179	40	1	21	56	10	128
8-Aug					10	10
9-Aug			21			21
10-Aug				56		56
11-Aug	40					40
12-Aug		1				1
FL180	33	60		8		101
10-Aug				8		8
11-Aug	33					33
12-Aug		60				60
FL181	35	42		2		79
10-Aug				2		2
11-Aug	31					31

12-Aug		42					42
13-Aug	4						4
FL182	16	8	6	1	1	10	42
10-Aug				1			1
12-Aug		8					8
13-Aug	8						8
14-Aug	4						4
15-Aug			6				6
16-Aug	3						3
17-Aug						10	10
18-Aug					1		1
20-Aug	1						1
FL183	44	9			31		84
20-Aug	10						10
21-Aug	26						26
22-Aug					31		31
23-Aug	4						4
24-Aug		9					9
25-Aug	4						4
FL184	31	14			21		66
22-Aug					21		21
23-Aug	29						29
24-Aug		14					14
25-Aug	2						2
FL185	103						103
20-Aug	19						19
21-Aug	83						83
23-Aug	1						1
FL187	96			13			109
10-Aug				13			13
11-Aug	96						96
FL188	104		3				107
13-Aug	43						43
14-Aug	61						61

15-Aug				3			3
FL189	11			9	1	2	23
14-Aug	4						4
15-Aug				9			9
16-Aug	7						7
17-Aug						2	2
18-Aug					1		1
FL19	12	32	21				65
28-Jul	10						10
29-Jul		32					32
30-Jul			21				21
31-Jul	2						2
FL190	55		26	1			82
10-Aug				1			1
12-Aug			26				26
13-Aug	52						52
14-Aug	3						3
FL191	32		27	4			63
11-Aug	7						7
12-Aug			27				27
13-Aug	10						10
14-Aug	15						15
15-Aug				4			4
FL192	54			15			69
13-Aug	24						24
14-Aug	30						30
15-Aug				15			15
FL193	3				1	6	10
16-Aug	3						3
17-Aug						6	6
18-Aug					1		1
FL194	61		23	3			87
12-Aug			23				23
13-Aug	44						44

14-Aug	17						17
15-Aug				3			3
FL195	89		18				107
12-Aug			18				18
13-Aug	74						74
14-Aug	15						15
FL196	46			15	1	21	83
14-Aug	2						2
15-Aug				15			15
16-Aug	44						44
17-Aug						21	21
18-Aug					1		1
FL20	12	22	15			5	54
28-Jul	1						1
29-Jul		22					22
30-Jul			12				12
31-Jul	11						11
1-Aug						4	4
3-Aug			3				3
5-Aug						1	1
FL210	31			6	2	7	46
14-Aug	12						12
15-Aug				6			6
16-Aug	19						19
17-Aug						7	7
18-Aug					2		2
FL214	58		32		3		93
22-Aug					3		3
23-Aug	51						51
24-Aug			32				32
25-Aug	7						7
FL215	108		5	1			114
11-Aug	1						1
12-Aug			5				5

13-Aug	72						72
14-Aug	35						35
15-Aug				1			1
FL218	77				6	23	106
16-Aug	3						3
17-Aug						23	23
18-Aug					3		3
19-Aug	30						30
20-Aug	37						37
21-Aug	4						4
22-Aug					3		3
23-Aug	3						3
FL219	88	1			4		93
19-Aug	9						9
20-Aug	38						38
21-Aug	41						41
22-Aug					4		4
24-Aug			1				1
FL22	46	2	1			45	94
25-Jul	2						2
26-Jul	42						42
27-Jul						45	45
28-Jul	2						2
29-Jul		2					2
30-Jul			1				1
FL221	82			1	1	11	95
9-Aug				1			1
10-Aug					11		11
11-Aug	82						82
12-Aug			1				1
FL222	59				4	1	64
13-Aug	12						12
14-Aug	47						47
15-Aug				4			4

17-Aug				1	1
FL225	64		3		67
13-Aug	22				22
14-Aug	42				42
15-Aug			3		3
FL226	29		21	2	52
14-Aug	9				9
15-Aug			21		21
16-Aug	19				19
17-Aug				2	2
19-Aug	1				1
FL231	1			1 9	11
17-Aug				9	9
18-Aug				1	1
19-Aug	1				1
FL232	81			7 39	127
16-Aug	77				77
17-Aug				39	39
18-Aug				7	7
19-Aug	4				4
FL235	115	3		4 11	133
22-Aug				3	3
23-Aug	103				103
24-Aug		2			2
25-Aug	4				4
26-Aug					6
27-Aug	8				8
28-Aug					5
29-Aug				1	1
30-Aug		1			1
FL238	44			1	45
19-Aug	13				13
20-Aug	24				24
21-Aug	7				7

22-Aug			1		1
FL239	36		91	16	143
17-Aug				16	16
18-Aug			91		91
19-Aug	18				18
20-Aug	11				11
21-Aug	7				7
FL24			1	3	4
1-Aug				3	3
4-Aug			1		1
FL240	1		1		2
21-Aug	1				1
22-Aug			1		1
FL241	41	2	12	53	108
15-Aug		2			2
16-Aug	32				32
17-Aug				53	53
18-Aug			12		12
19-Aug	7				7
20-Aug	2				2
FL242	20	1	23	34	78
15-Aug		1			1
16-Aug	15				15
17-Aug				34	34
18-Aug			23		23
19-Aug	4				4
20-Aug	1				1
FL245	22		12	1	35
21-Aug	21				21
22-Aug			12		12
23-Aug	1				1
26-Aug				1	1
FL247	20	10	10		40
21-Aug	1				1

22-Aug			10		10
23-Aug	18				18
24-Aug		10			10
25-Aug	1				1
FL25	102			27	129
24-Jul				27	27
25-Jul	100				100
26-Jul	2				2
FL251	15				15
11-Aug	15				15
FL252	46		44	15	105
17-Aug				15	15
18-Aug			44		44
19-Aug	44				44
20-Aug	2				2
FL253	28		6	48	82
16-Aug	28				28
17-Aug				48	48
18-Aug			6		6
FL256	166		7		173
20-Aug	8				8
21-Aug	108				108
22-Aug			7		7
23-Aug	50				50
FL257	61		34	7	102
14-Aug	15				15
15-Aug			34		34
16-Aug	46				46
17-Aug				7	7
FL259	1				1
31-Aug	1				1
FL26	27	11	18		56
2-Aug	27				27
3-Aug		11			11

4-Aug			18		18
FL260	16		9	7	32
28-Aug				1	1
29-Aug			9		9
30-Aug	10				10
1-Sep	6				6
2-Sep				6	6
FL27	1			2	3
3-Aug	1				1
5-Aug				2	2
FL270	38	2	6		46
20-Aug	6				6
21-Aug	24				24
22-Aug			6		6
23-Aug	8				8
24-Aug		2			2
FL272	42		5		47
20-Aug	13				13
21-Aug	29				29
22-Aug			5		5
FL273	21	1	29	83	134
15-Aug	3				3
17-Aug				83	83
18-Aug			29		29
19-Aug	17				17
20-Aug	1				1
24-Aug		1			1
FL274	121		8		129
19-Aug	23				23
20-Aug	42				42
21-Aug	54				54
22-Aug			8		8
23-Aug	2				2
FL282	7		21	81	109

16-Aug	4				4
17-Aug				81	81
18-Aug				21	21
19-Aug	3				3
FL284		1		2	3
28-Aug				2	2
30-Aug		1			1
FL285	32	80	5	2	119
22-Aug			3		3
23-Aug	28				28
24-Aug		79			79
25-Aug	1				1
26-Aug				2	2
27-Aug	1				1
29-Aug			2		2
31-Aug	2				2
1-Sep		1			1
FL287	23	15	15		53
21-Aug	2				2
22-Aug			15		15
23-Aug	20				20
24-Aug		15			15
25-Aug	1				1
FL288	2	24	36	32	94
28-Aug				32	32
29-Aug			36		36
30-Aug		24			24
31-Aug	2				2
FL289	1				1
8-Sep	1				1
FL292	59	2	2	1	64
19-Aug	25				25
20-Aug	29				29
22-Aug			2		2

24-Aug		2						2
25-Aug	5							5
26-Aug						1		1
FL293	22			7	51			80
16-Aug	22							22
17-Aug					51			51
18-Aug				7				7
FL294	19		2	13	33			67
15-Aug			2					2
16-Aug	19							19
17-Aug					33			33
18-Aug				13				13
FL295	46	8				22		76
24-Aug		8						8
25-Aug	45							45
26-Aug						22		22
27-Aug	1							1
FL296	22			6		77		105
18-Aug				6				6
25-Aug	13							13
26-Aug						77		77
27-Aug	9							9
FL297	11	2		3	1			17
17-Aug					1			1
18-Aug				2				2
19-Aug	5							5
20-Aug	4							4
21-Aug	2							2
22-Aug				1				1
24-Aug		2						2
FL30	13		3	1	5	5	13	40
4-Aug					5			5
5-Aug						13		13
6-Aug	10							10

7-Aug			3				3
8-Aug					5		5
10-Aug				1			1
11-Aug	3						3
FL311	14				12	77	103
16-Aug	14						14
17-Aug						77	77
18-Aug					12		12
FL312	10	11				4	25
30-Aug		6					6
31-Aug	4						4
1-Sep		5					5
2-Sep						2	2
4-Sep	4						4
7-Sep						2	2
8-Sep	2						2
FL314	3	2			18	51	74
27-Aug	3						3
28-Aug						51	51
29-Aug					18		18
30-Aug		2					2
FL316	1	55			26	6	88
28-Aug						6	6
29-Aug					26		26
30-Aug		54					54
31-Aug	1						1
1-Sep		1					1
FL317	13					85	98
16-Aug	12						12
17-Aug						85	85
19-Aug	1						1
FL32	14	23	1	1	7	9	55
1-Aug						1	1
2-Aug	3						3

3-Aug		23				23
4-Aug				7		7
5-Aug					8	8
6-Aug	11					11
7-Aug		1				1
10-Aug				1		1
FL325	21			12	2	35
17-Aug					2	2
18-Aug				12		12
19-Aug	14					14
20-Aug	6					6
21-Aug	1					1
FL326	1	30		75	16	122
29-Aug				75		75
30-Aug		27				27
31-Aug	1					1
1-Sep		3				3
2-Sep					16	16
FL33	22	41			7	70
22-Jul	22					22
23-Jul		41				41
24-Jul					7	7
FL34	80				4	84
24-Jul					4	4
25-Jul	47					47
26-Jul	33					33
FL346	44	6		7	63	120
24-Aug		6				6
25-Aug	23					23
26-Aug					62	62
27-Aug	21					21
28-Aug					1	1
29-Aug				7		7
FL347	1	39		55		95

27-Aug	1				1
29-Aug				55	55
30-Aug		39			39
FL348	48			54	102
21-Aug	36				36
22-Aug				54	54
23-Aug	12				12
FL350	104				104
20-Aug	96				96
21-Aug	8				8
FL36	55	22		7	54
31-Jul	52				52
1-Aug				53	53
2-Aug	3				3
3-Aug		22			22
4-Aug				7	7
5-Aug				1	1
FL375	85	10		28	123
21-Aug	7				7
22-Aug				28	28
23-Aug	76				76
24-Aug		10			10
25-Aug	2				2
FL38	87			7	94
25-Jul	27				27
26-Jul	60				60
27-Jul				7	7
FL40		10	112	1	123
29-Jul		10			10
30-Jul			111		111
1-Aug				1	1
3-Aug			1		1
FL41	50	35	23	12	120
27-Jul				11	11

28-Jul	50					50
29-Jul		35				35
30-Jul			23			23
1-Aug					1	1
FL43	2	5			4	11
30-Jul		3				3
31-Jul	2					2
1-Aug					4	4
3-Aug		2				2
FL44	53		29		7	89
5-Aug					7	7
6-Aug	53					53
7-Aug			29			29
FL47	67				5	72
24-Jul					1	1
25-Jul	2					2
26-Jul	64					64
27-Jul					4	4
28-Jul	1					1
FL48	42	47				89
28-Jul	2					2
30-Jul		47				47
31-Jul	38					38
2-Aug	2					2
FL49	55	18	2		13	88
27-Jul					13	13
28-Jul	55					55
29-Jul		18				18
30-Jul			2			2
FL51	1	2	2	1	3	9
3-Aug		2				2
4-Aug				1		1
5-Aug					3	3
6-Aug	1					1

7-Aug			2			2
FL53	9		11	16	2	38
5-Aug					2	2
6-Aug	8					8
7-Aug			10			10
8-Aug				16		16
9-Aug			1			1
13-Aug	1					1
FL54	3	24		63	2	92
2-Aug	3					3
3-Aug		24				24
4-Aug				63		63
5-Aug					2	2
FL540	100			10	1	112
17-Aug					1	1
18-Aug				10		10
19-Aug	57					57
20-Aug	43					43
26-Aug					1	1
FL548	8			56	38	102
16-Aug	2					2
17-Aug					38	38
18-Aug				56		56
19-Aug	6					6
FL55	26		34		18	78
6-Aug	26					26
7-Aug			33			33
8-Aug					18	18
9-Aug			1			1
FL553				1		1
29-Aug				1		1
FL579	3	10		16		29
29-Aug				16		16
30-Aug		10				10

31-Aug	3						3
FL58	42	7	18			21	88
28-Jul	1						1
29-Jul		7					7
30-Jul			18				18
31-Jul	37						37
1-Aug						21	21
2-Aug	4						4
FL580	104					2	106
3-Sep	52						52
4-Sep	34						34
5-Sep	4						4
7-Sep						2	2
8-Sep	10						10
9-Sep	4						4
FL581	10		60			21	91
31-Aug	10						10
1-Sep			60				60
2-Sep						21	21
FL6	5						5
22-Jul	5						5
FL60	1		2	7	5	3	18
7-Aug				1			1
8-Aug						3	3
9-Aug				6			6
10-Aug					5		5
11-Aug	1						1
12-Aug			2				2
FL6181	77		23	7			107
11-Aug	1						1
12-Aug			23				23
13-Aug	73						73
14-Aug	2						2
15-Aug				7			7

16-Aug	1						1
FL65	65	65					130
2-Aug	65						65
3-Aug		65					65
FL66						2	2
1-Aug						2	2
FL67	5	46	1	32		13	97
2-Aug	3						3
3-Aug		46					46
4-Aug				32			32
5-Aug						13	13
6-Aug	2						2
7-Aug			1				1
FL68				1			1
4-Aug				1			1
FL69	114			25	3	14	156
1-Aug						14	14
2-Aug	45						45
17-Aug					3		3
18-Aug				25			25
19-Aug	38						38
20-Aug	31						31
FL70	23		1	53	1		78
9-Aug			1				1
10-Aug				53			53
11-Aug	19						19
14-Aug	2						2
16-Aug	2						2
17-Aug					1		1
FL71	96	11	4	1		1	118
1-Aug						3	3
2-Aug	89						89
3-Aug		11					11
4-Aug				1			1

5-Aug					2		2
6-Aug	7						7
7-Aug			4				4
8-Aug					1		1
FL72			8	4	12		24
7-Aug			7				7
8-Aug					12		12
9-Aug			1				1
10-Aug				4			4
FL73	4	26			50	7	87
2-Aug	4						4
3-Aug		26					26
4-Aug					50		50
5-Aug						7	7
FL75	12		13	1			26
11-Aug	3						3
12-Aug			13				13
13-Aug	7						7
14-Aug	2						2
15-Aug				1			1
FL76	1		17	4	9		31
8-Aug					9		9
9-Aug			17				17
10-Aug				4			4
11-Aug	1						1
FL80	20	26				26	72
30-Jul		26					26
31-Jul	20						20
1-Aug						26	26
FL81	3				36	28	67
4-Aug					36		36
5-Aug						28	28
6-Aug	3						3
FL82	13		2	27	11	1	80

7-Aug				2			2
8-Aug						26	26
9-Aug				25			25
10-Aug					11		11
11-Aug	2						2
12-Aug				2			2
13-Aug	9						9
14-Aug	2						2
17-Aug						1	1
FL83	22		1	6		2	31
12-Aug				1			1
13-Aug	16						16
14-Aug	5						5
15-Aug					6		6
16-Aug	1						1
17-Aug						2	2
FL84	35	4	28			1	68
29-Jul		4					4
30-Jul			28				28
31-Jul	35						35
1-Aug						1	1
FL86	6	6	2			11	25
29-Jul		6					6
30-Jul			1				1
31-Jul	4						4
1-Aug						11	11
2-Aug	2						2
3-Aug			1				1
FL9	25		4			75	104
30-Jul			4				4
31-Jul	21						21
1-Aug						75	75
2-Aug	4						4
FL91	29					40	69

31-Jul	17						17
1-Aug						40	40
2-Aug	12						12
FL92	39		1		14	2	70
4-Aug					14		14
5-Aug						14	14
6-Aug	39						39
7-Aug			1				1
8-Aug						2	2
FL94	5	1	9	6		6	29
5-Aug						2	2
6-Aug	5						5
7-Aug			7				7
8-Aug						6	6
9-Aug			2				2
10-Aug				6			6
12-Aug		1					1
FL95	33			7		40	80
15-Aug				7			7
16-Aug	25						25
17-Aug						40	40
19-Aug	8						8
FL98	9	4		1			14
10-Aug				1			1
11-Aug	6						6
12-Aug		4					4
13-Aug	2						2
14-Aug	1						1
FL99	49	11			41	1	102
31-Jul	32						32
2-Aug	17						17
3-Aug		11					11
4-Aug					41		41
5-Aug						1	1

Grand Total	39	36	6870	172	1257	586	782	343	534	1511	947	418	1293	9	14797
-------------	----	----	------	-----	------	-----	-----	-----	-----	------	-----	-----	------	---	-------